POPULAR AVIATION

Combined with Practical Mechanics; Including Aeronautics and Aviation Stories and Mechanics

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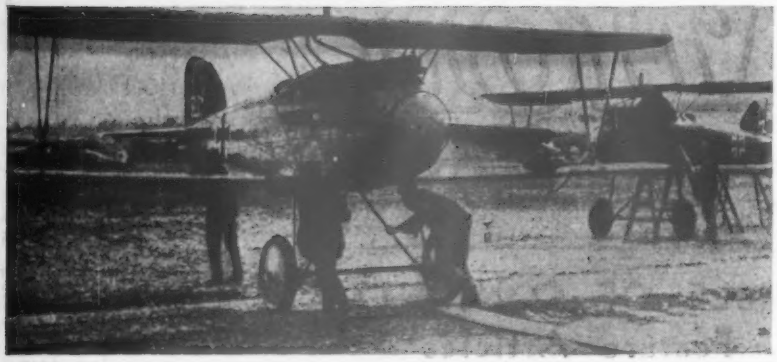
A Chat With



Two planes belonging to one of Richthofen's staffels being serviced by the mechanics after a flight. It was with machines such as these that Richthofen's squadron dealt death and disaster to the allied air corps.

by
CARL B. OGILVIE

Noted Expert on World War Tactics and History

FAMOUS Aces and fighting airmen of many nations have related to me innumerable strange stories of their weird adventures and dangerous experiences in the air.

Their stories are gripping ones of flashing planes, roaring motors, yammering machine guns, rare courage, the unfathomable element of chance—the breaks—and death striking out of a blood-drenched sky with the appalling speed of a thunderbolt.

Most of the stories have been stirring ones of high adventure; others tragic, a few humorous; but they all follow, more-or-less, a similar pattern. One, however, in my large and complete files of war-time data, is entirely different. The story told to me by Oberlieutenant Lothar von Richthofen.

He related to me one of the most amazing air stories of the World War: the inside story of how Manfred von Richthofen's own men proposed to abduct him.

Richthofen's comrades, pilot officers under his command, by military law and appointment his subordinates, openly plotted to kidnap him. It is a weird, ghastly, grim story. A plot of unsurpassed magnitude and daring. It borders on the fantastic and almost unbelievable, yet as the facts came from Lothar von Richthofen's own lips, I was convinced he was telling me the truth. Later I checked with other former pilots of *Jagdstaffel* 11 and they all collaborated Lothar's statements.

Through unofficial circles I had heard of the three daring Allied pilots who made a remarkable attempt to kidnap Baron Manfred von Richthofen. A vivid account of this was published in the October issue of POPULAR AVIATION.

"Intelligenee," shortly after von Richthofen's death, came into possession of the amazing information that the pilots of *Jagdstaffel* 11—the squadron of which Richthofen was captain and leader after Boelcke's accidental death—had carefuly planned a staggering plot to kidnap their famous leader. Frankly, I didn't put much credence in the information. We felt some captured German pilots had taken our Intelligence Officers for a joy-hop.

ON my first trip to Berlin, while our Army of Occupation was still on duty along the Rhine, I learned that Lothar von Richthofen, younger brother and succeeding commanding officer of *Jagdstaffel* 11, was visiting his mother at the family home in Schweidnitz. I flew there without delay. In their large white home, Lothar and Frau von Richthofen greeted me pleasantly.

After a few pleasantries, the grey-haired German woman, wife of a German officer and mother of two blonde-haired sons whose combined victories totaled officially 120 planes—possibly 150 men shot down in defeat—left the room. I studied Lothar, the brother of the greatest killer of the skies the world has ever known.

MR. OGILVIE, in a visit to the brother of Baron Manfred Richthofen, is told of some amazing and weird facts concerning the attempted abduction of the Baron by his own men.

Further, he is shown the private war museum of the Richthofens which is replete with ghastly souvenirs of the Baron's prowess as an air fighter.

Germany's Ace of Aces assembled this museum of vanquished foes with as little concern as the average man would maintain a hunting trophy collection.

He was attired in riding boots and breeches. His elk horn riding crop kept constantly tapping against his boot top—a habit that told me of his earlier war service in the Fourth Regiment of Dragoons, where he saw service in a mounted outfit as had his illustrious brother, Manfred.

I couldn't help but recall that Lothar had fought and won for himself a most remarkable and high position in the German War Department records and in the esteem of his countrymen. Unlike Manfred, who had been trained for military service and was a commissioned officer, Lothar had entered service, as a buck private—a *Fahnenjunker*, or one eligible for commission after satisfactorily completing student-officer duties. He actually reached the Western Front before Manfred. Both, with their respective mounted troops, had taken part in the world-astonishing drive on Paris in 1914.

When Lothar finally got into the Air Service he was assigned to Manfred's own squadron and considerately given a war-torn ship of Manfred's which the great *Rittmeister* had discarded. But in that battered red Albatross Manfred had won 10 of his 80 victories. Lothar attempted to equal his famous brother's record.

He was more reckless than Manfred. He fought with a flash of daring not in Manfred's system. Manfred was cautious, scientific and sure of each maneuver before he dived at a foe. Chance was with Lothar more times than skill when he won victories. Manfred called him a "butcher," because he displayed the killer instinct of attempting to wipe the sky clear of every enemy plane in sight.

The war was not so far distant but what Lothar still lived in the glory of bygone martial days. His positive assertions of Germany's air supremacy, his enthusiasm and almost personal conceit were overshadowed by his cordiality and magnetic personality. He showed me a crumpled newspaper clipping and said proudly:

"He was my twenty-second victory."

I took the clipping. It was a reproduced photograph of the Boy Ace, Captain Albert Ball, smiling with boyish pride at the silver casket which had been presented to him by the City of Manchester in honor of being England's leading Ace.

I SAID nothing about records which disputed that Lothar von Richthofen had actually shot down Ball whose official victories were listed as 43 German planes. Ball had been killed in the dog-fight in which Lothar took part.

Lothar von Richthofen

SHORTLY after Richthofen was shot down by Capt. Brown, the Baron's comrades-in-arms made a vow to recover Richthofen's body from the British lines, this being inspired no doubt by a previous attempt of three Allied pilots to capture the Baron alive.

Inscription from the monument marking Baron Manfred von Richthofen's grave. Note the full name of von Richthofen which has seldom been published.

Obviously, Lothar and the German Air Force believed the credit of downing England's greatest Ace belonged to the brother of Germany's greatest Ace. I let it go at that.

Lothar himself had been shot down during that dog-fight with a bullet in his hip. He had landed weak from loss of blood and nearly unconscious. I wanted to ask him about the deep bullet scar above his right eye. He received that on the fateful thirteenth day of March, 1918—ten months after his encounter with Ball's squadron—when he was forced down nearly out of control behind the German lines to crash his face into the instrument board and for a time to despair of losing his teeth, eye, and nose. But I preferred to talk of his many medals; the Iron Cross First Class and particularly the Pour le Merite, a medal both he and his brother had received from the Kaiser.

With a remark that he had showed me one of his most treasured possessions, Lothar announced he would now show me the only room of its kind in the world. He led me to it.

Lothar told me it was Manfred's bedroom. It was a museum! Manfred had made it; made it with the newest instrument of death to be employed by struggling armies—the airplane and the death-dealing synchronized machine gun.

Everywhere, on walls, ceiling and floor were gruesome trophies of war. Relics of bloody days when Manfred had dealt death on the wing to over a hundred Allied pilots. Trophies collected at the price of human blood. Strips of airplane fabric cluttered the walls; some bore large numerals; others the red, white and blue *cocarde* of the French and British Air Services.

A helmet, Manfred's, hung on one wall near a window. The two jagged bullet holes in the left ear flap told mutely of the first time the great bloody Ace had been shot down. The electric chandelier above my head was fashioned from a rotary motor taken from a French plane near Verdun. Before me was a grim table constructed of shattered propeller blades. Its center piece was an aviator's compass.

The reading lamp beside the bed had been wrought from the metal hub of a British airplane's landing wheel. Above the door was a silent, gloomy Vickers machine gun—Manfred's triumph over a gun that had sought to end his life.

ON the shelved side-table, against the wall, was what I had come to see—row after row of small silver cups. Manfred had ordered them himself. Each was a token of victory. Gifts on the altar of War's sacrifice they stood, mutely telling of the sacrifice of life and blood—life Manfred had snuffed out with Spandau lead. "Victory cups," Manfred had called them. They were Dead Men's Cups.

An informal snap-shot of Baron Manfred von Richthofen taken at a German airdrome and in front of an early machine belonging to the ace.

Awed by the ghostly silence and contents of the chamber of death relics, I thought of Manfred von Richthofen, of Fonck, Bishop, and Mannock. Supermen! Each had shot down more than seventy planes.

As if reading my mind, Lothar spoke: "He was victor over so many. Yet he lies victor with those he vanquished in the soil of France."

I reflected. "You have never brought him back."

"Someday," said Lothar, then a strange light warmed in his eyes and he asked: "Did you ever hear of the plan my brother's flying comrades had to bring his body back on April twenty-second, Nineteen 'eighteen—the day after he went down near the British lines?"

"No! Impossible!" I exclaimed in the same breath.

Lothar smiled. "I know it will sound crazy to you, my friend, but at that time his pilots firmly believed it would be possible. At that time I was convalescing from my wounds, but I heard of it from the lips of the pilots of *Jagdstaffel* 11 when I was appointed their commanding officer to take my brother's place."

I listened and this is the amazing story Lothar von Richthofen told me:

* * *

"MY brother's comrades of *Jadgstaffel* 11 were stunned when he did not return with them after the dog-fight with the British Camels. Fear and dread hung heavy in their hearts. They idolized Manfred although he was very strict. He was their ideal, a great national hero, a—well, if you will excuse a brother's pride, their god. At first it was thought that he had developed engine trouble and been forced down, that he might be making his way back to

his airdrome and hadn't had an opportunity to report.

"Then came to *Staffel* 11's headquarters at Cappy the information from one of our front line observers. 'Red triplane landed under control on hill near Corbie. Pilot not seen to leave plane.'

"Then it was known that Manfred had landed near the British lines. Hope was that he had been taken prisoner as it seemed impossible he would be dead for his plane landed under control. Our flying officers had flown tirelessly over the spot trying to locate Manfred's plane. Their efforts were fruitless.

"But that night it was learned through British official channels that Germany's beloved hero was dead; his body lying in state in a tent hangar at Bertangles.

"There was only one answer to that: reasoned the officers of the Flying Circus—that my brother had been shot to death in his plane after landing. It was barbarous.

"When the full force of the shock struck *Jagdstaffel* 11 there were, naturally, many utterances of vengeance. Our pilots, erroneously believed that their greatest inspiration and commanding officer had been, instead of being taken prisoner, murdered in cold blood on the ground. The officers were in a black mood, desperate, grief-stricken.

"Many had a curious belief that Manfred was a super-man, one that could go on winning victories, yet never be shot down. It was a foolish if complimentary conviction.

"Some few months before this event an attempt had been made by several Allied pilots to kidnap my brother. This incident was still strong in our officers' minds. They then hatched a plot to steal Manfred's body away from the British. A gruesome task, I'll admit.

"I know it sounds ridiculous, but remember, their minds were overwhelmed with grief and a wild desire to strike back at the enemy that had robbed them of their leader. Lieutenant Lowenhardt presented the reckless plan to Lieutenant Hartman, *Jagdstaffel* 11's Adjutant. It was briefly as follows:

"LOWENHARDT requested permission for himself and two other officers to fly two-seater planes over to the British airdrome, land, recover the body of Manfred from the tent hangar, put it in one of the two-seaters and fly back to our airdrome. Then they could fittingly honor their dead leader; give him a dignified military funeral—which, of course, the British most kindly did."

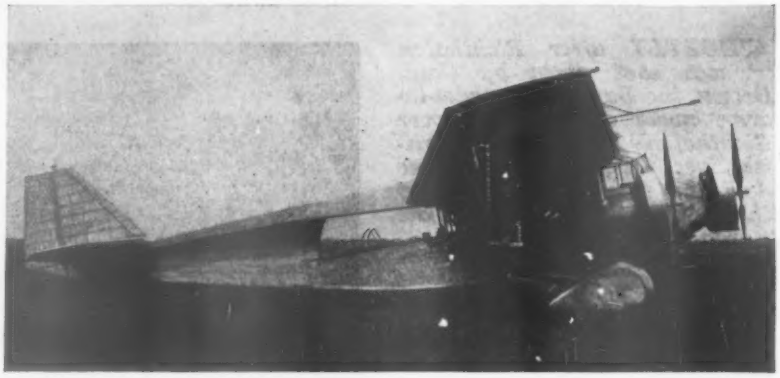
"But," I puzzled in astonishment, "how did they propose accomplishing such a reckless and impossible thing?"

"It was reckless and impossible, I'll admit," said Lothar, "but this is how they planned to do it:

"Orders would be flashed to our artillery observers to be on the alert for the two-seater planes. The officers

(*Concluded on page* 127)

Here is the Nieuport-Delage "Colonial"



This Nieuport-Delage is interesting because of the unusual arrangement of the gunner's position. He fires through openings in the sides of the fuselage.

THE latest plane from S. G. A. French factory, the new Nieuport-Delage 590, represents the latest effort of French constructors to produce a plane that can be employed equally well for military or commercial purposes.

It combines a typical Nieuport refinement of detail with a sturdiness and general strength of construction that is too often missing in French machines of all types.

The new Nieuport is called the "Colonial" in allusion to the fact that first ones to leave the factory are being put into the French government airlines for colonial service in Africa, where multi-motored machines are almost a necessity. It is a three-motor job, a high-wing cantilever monoplane with one motor at the front of the fuselage and the other two under the wing at the sides where the supporting struts for the landing gear rise to the under side of the wing.

The construction of the Nieuport Colonial is entirely metallic, all coverings and the main structure being of the French L2R alloy, and the main assembly members of special steels. It can be demounted into a certain number of separate elements for ready transport and occupies a remarkably small space in this state. Wings, central plane, tail assembly, rear portion of the fuselage, motor mountings, landing gear and main fuselage all disassemble as separate parts.

It is equipped with short-wave radio, and as a military plane can be readily fitted as a hospital plane or with two machine guns, a camera, 50 grenades and two bomb racks. As a commercial machine it belongs in the class of the large transport planes.

The Record Breaking Potez 50-A2

THE latest plane from the Potez factory, the Potez 50-A2, in the hands of pilot Gustave Lemoine, succeeded in cracking three world's records in a single flight, and taking back from America to France, the record for covering 500 kilometers with 100 kilograms of load. This record was formerly held by Lee Schoenhair, the American speed merchant, who had accomplished this feat with a Lockheed "Vega."

The plane, a two-seater observation machine, is equipped with a Gnome-Rhone K-14 motor developing 700 horsepower.

The Potez 50-A2 is a clean-cut O. C. biplane which has beaten the time of the Lockheed "Vega". Another biplane triumph.

The First Air Mail Flight

by MRS. ADELAIDE OVINGTON

An inside story of the first airmail trip, flown by Earle Ovington with a Bleriot XI monoplane during the Nassau Boulevard airmeet, Long Island.

FESTIVE, indeed, was the setting for the first United States airmail flight. A ten day international aviation meet was in progress and the airdrome at Nassau Boulevard, Long Island, was a riot of color. Alongside the hangars was a gaily colored tent in which were green tables and chairs, where refreshments were being served to men in white flannels and women in hued sport clothes.

Even the airplanes themselves lent color to the scene. The Wright biplane of George Beatty, with its pure white wings; Captain Tom Baldwin's Red Devil; the giant gray "family bus" owned by the young English pilot Tom Sopwith and my husband's cream colored Bleriot monoplane, "The Dragonfly."

The aviation field itself was as smooth and green as a piece of velvet. The long row of hangars, with electric lights and roomy work-benches, bordered one side of the airdrome. The sheds were painted green and each one had a large white number on it so that every bird knew the minute it alighted in just which cage it belonged. Flags were flying from the hangars which gave a holiday air to the whole place.

At the head of everything, and the moving spirit of it all, was Timothy L. Woodruff, Lieutenant-Governor of New York. Seldom a day went by that he and his beautiful young wife did not appear on the field. But his enthusiasm did not stop there, for it was through his generosity that this ideal airdrome was made possible.

His big-heartedness went even further, for he provided the aviators with a private club house in which to live. This little house, which we called "The Aviary," was new and pretty and the Governor had fitted it out with every possible comfort—even to a maid and butler from his own establishment.

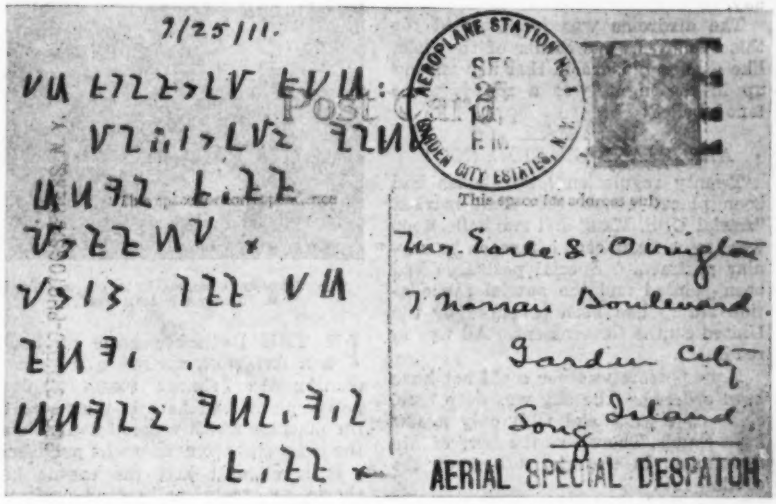
Earle Ovington always did have an imagination. I had not been married to him long before I discovered that he was a dreamer. He loves to dream dreams, but he is also practical enough to put foundations under his dreams and make them come true. On the opening day of the meet, therefore, when Governor Woodruff was looking for someone to carry the first aerial mail, Ovie immediately became interested.

"Is this the first time it has ever been carried in America?" he asked eagerly.

"The very first," the Governor assured him.

Then Ovie's imagination began to work. He looked ahead many years and could see aerial mail routes established all over the country. He knew when that time came he would like to remember that he had been the pioneer of them all—the very first postman to cut a pathway through the air.

"I'll take it," he said briefly.



This postcard carried on the first airmail trip is written in the code often used by Mr. Ovington and his wife. It is written in "Morse", the vertical lines being "dashes" while the short horizontal lines are the "dots" in this telegraphic code. Can you decipher it?

No person can carry the mail unless sworn in and so, upon the authorization of Postmaster-General Frank H. Hitchcock, Ovie was duly appointed "First United States Aeroplane Mail Carrier." The regular form of oath was filled out and executed by the postal authorities and Earle Ovington. A photostatic copy has been placed in the Smithsonian Institution at Washington, D. C., together with the actual engine used on this historic flight.

Earle Ovington receiving the first bag of airmail from the Postmaster-General.

The Postmaster-General came from Washington especially for this event, looking forward to actually flying with Ovie on one of the mail trips. This speaks well for the courage of the "General," as he was affectionately called. He not only had the far-sightedness to vision the wonderful future of the airmail but he had the courage to trust himself to those early contraptions of wood, wire and canvas.

Unfortunately, Ovie's ship was a single place plane with no room for anyone but the pilot. Determined to make the flight over the mail course, however, the General flew with Captain Paul Beck one afternoon in a U. S. Army Curtiss biplane and on this trip carried a portion of the day's mail. This was the only time at the meet when the mail was carried by anyone but Earle Ovington.

There were 640 letters and 1280 postcards for the initial flight. These were cancelled with a special stamp "Aeroplane Station No. 1," and the new cachet "Aerial Special Despatch" applied, and placed in a large canvas mailbag. These envelopes, today, bring $30.00 without Ovie's signature and $60.00 with it and are so listed in the "air mail cover" catalogues.

During the nine days that Ovie acted as flying postman, he carried 43,217 pieces of mail, comprising postcards and letters. It is interesting to note that out of this large number, there are probably not over three hundred which have come to light in the hands of collectors. We know this because practically all of the "covers" are sent to Ovie for his signature as soon as the collectors receive them. For the benefit of those who do not collect these interesting souvenirs, an envelope marking the

first flight of any new route is known as a 'first-flown air mail cover."

Nassau Boulevard was surrounded by some of the wealthiest homes on Long Island and society, en masse, turned out the afternoon of September 23, 1911, to witness the first air mail flight. This was to be the leading feature of the International Aviation Meet's opening day.

The airdrome was transformed for this event. In one corner of the field, like a huge mushroom that had sprung up in the night, was a round, white tent labelled:

U. S. MAIL
AEROPLANE STATION NO. 1

Twenty regulation letter boxes had been placed about the field marked "Aerial U. S. Mail" and two collections were to be made each afternoon by regular postmen. Special postcards had been printed and the special cancellation stamp had been prepared by the United States Government. All was in readiness.

More perfect weather could not have been ordered. The sky was deep blue, clear as crystal and with only a few light clouds. There was the tang of late September in the air, a hint of the coming fall.

An interested crowd watched Ovie's three French mechanics wheel out his racing Bleriot, "The Dragonfly." This monoplane was a thing of beauty—the light fuselage, so trimly built for speed; the tightly-stretched wires; the polished walnut propeller; the powerful, glittering engine; the slim white wings already poised for flight.

Putting on his goggles and "crash" helmet—a leather casque lined with steel wool which he brought with him from Paris—Ovie climbed into the cockpit of the plane. The big bag, filled to bursting with seventy-five pounds of mail, was handed up to him and he put it on his lap. There was no room for it anywhere else as this was a one-place plane and no provision had been made for carrying baggage.

Alfred, his chief mechanic, gave the big propeller a spin and, after two or three revolutions of the polished blades, the engine started with a roar. Half a dozen men clung to the tail of the machine, bracing themselves with all their strength to hold it back. At the proper moment, Ovie raised his hand as a signal to let go and the plane raced across the field. Gaining speed at every instant, he was soon going over fifty miles an hour though still on the ground. A slight pull of the elevator and his monoplane sailed majestically into the air and rose rapidly.

Up, up he went, climbing the long invisible hill and steering in wide circles over the aviation field. It was not until he was fifteen hundred feet above the aerodrome that he straightened out his course for Mineola.

We watched the monoplane disappear in the distance—history in the making!

END.

Photo of the Johnson Steam Plant

The Johnson steam aviation power-plant mounted on a test stand.

IN THE December issue of POPULAR AVIATION, we ran a story concerning the Johnson steam airplane power plant, and here is the photo of the machine which was not available at the time that the article was published.

It is claimed that the engine has shown an exceptionally good performance in its ground tests, and it is likely that we will soon be able to describe the flight tests that are about to be made. It will be remembered that this plant is of the binary vapor type in which two different fluids are employed, one of them being water while the second is a fluid with a lower boiling point.

Port of Missing Men

JACK ROSE. We are holding a bunch of letters for you that have been forwarded so often that they're nearly worn out. The letter with the special delivery stamp started out on its rounds, August 7, 1932. Please send for them as soon as possible.

WALLACE SANDERS. Fred Krug would like to get in touch with you. He saw your letter published in P. A. Fred Krug's Address is 330 E. Wisifield Ave., Roselle Park, N. J.

GLENN W. BERK. Since your letter appeared in the September issue, we have had a number of inquiries for your address. Thank you for the same.

V. L. SMITH and HUGH ALLEN who wrote the story on the blimp "Volunteer" in the November issue, please send us your address. It is important.

ESTHER JOHNSON. A letter addressed to the Question and Answer Department was opened, and we found that a letter was enclosed by mistake. There was also a lock of blonde hair enclosed. Please come and claim the hair. No, we can't answer that question.

JAMES QUINCY SAWYER. We have had several inquiries for you, but as we neither know you nor your address, please tell us what to do next.

SUTOR, the inventor of the Diesel engine published in the March issue. There have been a number of inquiries for your address. Please send it to us.

ADOLPH SSHI, SHIR, or SHIRR,—we can't make out the name—please send your address. A letter was received for you but no address was given.

Parachuter Discovers Cabbage Patch

SERGEANT LIONEL EDWARDS, of the 94th Pursuit Squadron of the Army Air Corps, Selfridge Field, Michigan, recently discovered something new under the sun. In a most unorthodox manner, he found a cabbage patch.

Acting as gunner for an Air Corps officer in a pursuit plane, Sergeant Edwards was admiring the shifting alternating farm lands and clouds, as the officer maneuvered his plane in a barrel roll. Suddenly, the gunner's sensations changed! He found himself hurtling down toward the ground far below. His safety belt had snapped when the pursuiter was upside down and rolling outward, the rapid movement of the ship had flung him into the fastnesses of space.

It seemed to the sergeant there was but one thing to do. He must catch the plane when it came around again! He reached out—but the ship, its pilot blissfully unaware of his gunner's impolite and hasty departure, was too far away.

The sergeant bethought himself of his parachute. He yanked on the release ring. Came a shock, and his body was almost snapped in two. Then the speed of his descent decreased, and in due time Sergeant Edwards made a happy landing in the middle of a hitherto undiscovered—by aviators—cabbage patch.

Imagine his embarassment!

Here Are a Famous Pair

HERE we have two notables of the automotive world, Glenn Curtiss at the left and Henry Ford who are apparently holding a postmortem or antemortem on an ancient Curtiss flying boat. We wonder what is passing through Ford's mind as he smilingly views this 1912 acquisition to transportation?

Glenn Curtiss (left) and Henry Ford inspect an early Curtiss flying boat.

The Duties of an AIR HOSTESS

by LEO FREEDMAN

An inside review of the daily life of an air hostess, soon to be released as a film feature by Columbia Pictures under the name of the *Air Hostess*.

PROBABLY the newest career in the world is that of air hostess.

There were none four years ago; there are not many now—not more than fifty active followers of this most modern profession for women in the entire United States. And still, in spite of their small number, they have contributed greatly to popularizing commercial aviation.

No one can have any timidity about traveling by air after witnessing a slender hostess going unconcernedly about her duties. Time and time again a "first-flighter," enticed into trying air-travel through the need of journeying quickly, has entered a plane uncertain of the pleasure of voyaging by airplane. After seeing the air hostess he has flung worries aside exclaiming, "If you can be so self-possessed, I don't see why I should worry."

The truth is, as has been revealed by the records of the many companies engaged in carrying passengers by plane, that there is no cause for anxiety or alarm. The air hostess has been instrumental in banishing distrust during the very first minutes of the trip and made it possible for her passengers to enjoy air-travel to its fullest.

The air hostess at the present time holds the adventuresome spotlight. Her life and duties are so unusual, interesting and intriguing that they are to be dramatized in a motion picture. It is to be called "Air Hostess" and Columbia Pictures is preparing to make the film on the airlines running from Kansas to the Western Coast. It will be a picture of commercial aviation in which the air hostess is the heroine.

An air hostess is always a slender miss. With her overnight bag she must not weigh more than 125 pounds. She is selected for her poise and personality as much as any other single trait. She must be of the "calm and collected" disposition. No knowledge of flying is necessary although several air hostesses hold limited pilot licenses. It is discovered, very early in the probationary period, whether she takes naturally to air travel. They always do. Up to now there is no case on record where a girl was rejected for air hostess service because of a tendency toward air-sickness.

The co-pilot checking up on the pretty air hostess, or maybe he's just checking up on the sandwiches. A scene from the Columbia film—"*The AIR HOSTESS.*"

Although air hostesses are trained and prepared for emergencies, they rarely are called upon to make use of their knowledge. Air-sickness has been over-exaggerated. It is rarer than is supposed. Many of the hostesses have to think back months to remember a case of sickness. It is not nearly as common now as it was in the early days of air travel. This is partly for the reason that the proportion of first flighters decreases daily, but mainly because of a changing type of passenger.

In the beginning, people traveled by air because it was essential to travel in a hurry. The men were rushing to important business deals; the women were hastening to sick relatives. They were nervous and tense. Their anxiety, added to their nervousness in using a new means of transportation, induced a mental and physical mood that invited air sickness.

Air hostesses were introduced into the service to counteract this uneasiness. They have performed a great service. How can you be nervous when an attractive and bright-eyed young lady is indifferent to her means of transportation?

And they are unconcerned. They would rather ride in a plane than travel by subway. After all, flying can be no novelty to one who has flown from the Newark Airport to Richmond twice daily, five times a week, for two years. And that is the shortest of the runs. Most of the hostesses have over 100,000 miles in the air to their credit.

The air hostess on her "beat" attending to the comforts of her charges.

NOT all lines have air hostesses, but the high flying ladies have accomplished so much and are so appreciated

by air travelers that many lines are considering employing them. Don't imagine they travel only for the ride. They have work to do—lots of it—but it is agreeable work because they like to fly and they enjoy seeing the world from the air.

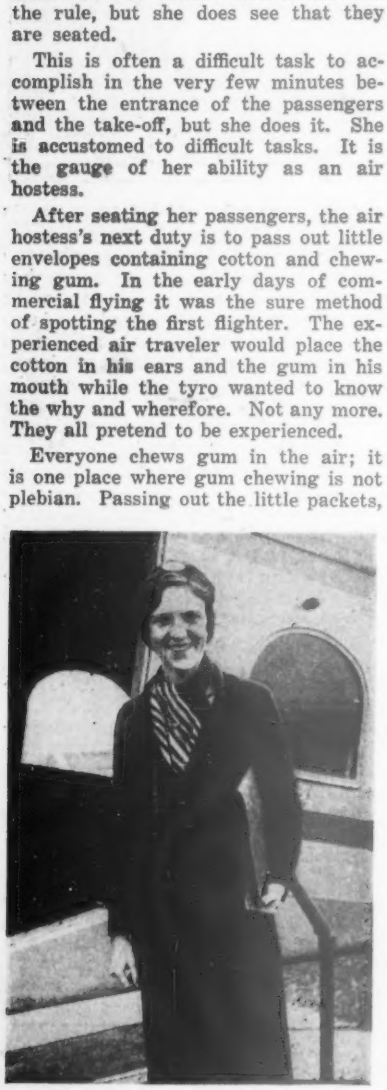
The hostess is waiting at the door of the plane when the passengers enter. It is her duty to see that all passengers are seated before the plane leaves the ground. As experienced air travelers know, passengers may walk about to their heart's content while the ship is in the air, but they must be in their seats on the take-off and on landing.

The air hostess guides her passengers to their seats, diplomatically not informing them that they must be seated lest the restriction of their movements make them apprehensive. Her chief duty, almost her main duty, is to banish all hesitation and timidity. An order would increase their uneasiness. So she doesn't inform them of the rule, but she does see that they are seated.

This is often a difficult task to accomplish in the very few minutes between the entrance of the passengers and the take-off, but she does it. She is accustomed to difficult tasks. It is the gauge of her ability as an air hostess.

After seating her passengers, the air hostess's next duty is to pass out little envelopes containing cotton and chewing gum. In the early days of commercial flying it was the sure method of spotting the first flighter. The experienced air traveler would place the cotton in his ears and the gum in his mouth while the tyro wanted to know the why and wherefore. Not any more. They all pretend to be experienced.

Everyone chews gum in the air; it is one place where gum chewing is not plebian. Passing out the little packets,



A veteran air hostess in real life who numbers her air-miles by the hundred-thousands.

Miss Evalyn Knapp of Columbia Pictures, portrays the heroine of the "*AIR HOSTESS.*"

the air hostess has the opportunity of speaking to the passengers and discerning their tastes. If they wish to be alone, she sees that they are, often suggesting a seat where they can be more comfortable and undisturbed.

AIR hostesses are members of the crew but they are advised to be non-official in their attitude toward their passengers. The emphasis in their title is on the word "hostess" and not on "air". They must be appealing and be able to see to it that their charges enjoy the trip. The duty of an air hostess is to make her passengers feel like guests rather than travelers.

"Act as if you are entertaining guests in your own home," Mrs. Dumont, in charge of the hostesses on the Eastern Air Transport system, instructs her staff.

And that is their aim. If you wish to talk they will converse with you. If you want information about aviation, they are there to help you. If you desire to know something about the country over which you are voyaging, they are present to sing out, "On your right you can see—," and "on your left you have—".

When the tea hour arrives they serve tea. If you are journeying during the morning, they serve bouillon. If you would like a cold bottle of soda they will bring it to you. Would you like to smoke? They will offer you cigarettes. Cigar smoking is not permitted. The heavy smoke may be offensive to some passengers.

Smoking is restricted to one section of the plane, not through safety measures, but because there are always passengers who find smoke objectionable. The hostess must employ tact to see that smoking goes on only in the smoking section and shift passengers to the group of smokers or the non-smokers.

That their talents have not been wasted is proven by the steady flow of mail to the home office from passengers who wish to express their grateful ap-

(*Continued on page* 124)

No Longer Guesses Cloud Heights

ONE of the oldest sciences and one of the oldest theorems of that science comes to the aid of aviation in determining weather conditions.

Now, there is no more guesswork as to the height of the clouds. A new ceiling finder, the theodolite, does the trick.

One light casts its beam into the air at an angle. From an instrument 528 feet away, the observer can "sight" on the point where the beam hits the first clouds. He reads the angle by pointing part of his instrument, and computes the angle at which this imaginary line intersects the beam of light.

Knowing two angles and one side it is easy to determine the ceiling.

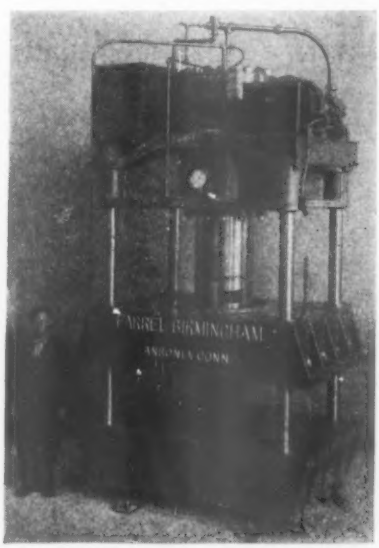
Another method, is to free a small sounding balloon and watch it until it disappears in the clouds, accurately timing its ascent with a stop watch. Since standard balloons have a constant rate of ascent, the height is easily computed.

Hydraulic Press for Vought Plant

IMPROVED mass production equipment is finding its way into the larger airplane plants. We show by the accompanying photo, an oil-hydraulic press built for the Chance Vought Corporation by the Farrel-Birmingham Company.

Presses of this type are employed for pressing out sheet metal airplane parts between dies and under tremendous pressure. The press shown is capable of exerting a pressure of 200 tons or 400,000 pounds.

Oil under high pressure acts on the end of a huge plunger, which in turn forces the dies together over the metal part being formed. The oil pump is mounted directly on the press and is driven by an independent electric motor.



The 200 ton oil-hydraulic press for aircraft manufacture.

Latest Anti-Aircraft Equipment

by S. F. ASHCROFT

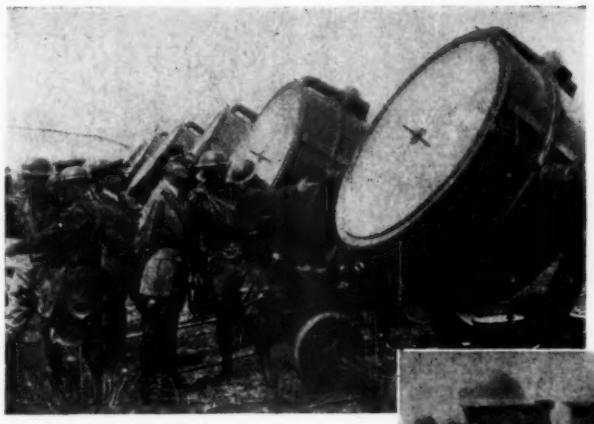
Perfected anti-aircraft guns, searchlights and locaters, now menace the safety of military aircraft flying below 20,000 feet. The U. S. Coast Artillery have made wonderful progress in the development of ground batteries.

WITH every advance in the design and performance of military airplanes come the counter developments made by the anti-aircraft division of the service so that these two arms of the service are in constant and intense competition with one another.

During the World War, the anti-aircraft equipment was not to be greatly feared by the enemy planes. The equipment was crude and the percentage of hits was ridiculously low. In spite of the slow speed of the World War planes, a hit was mostly a matter of luck on the part of the ground battery rather than a matter of precise calculation.

But since that time, matters have changed very materially, although little has been written on this subject by the aviation press. The anti-aircraft guns have been vastly improved, while the methods adopted for locating and sighting hostile aircraft have been advanced by fully 1,000 per cent.

And this accuracy of fire holds both for day and night air attacks. Much credit is due to the Coast Artillery for the intensive development of the anti-aircraft equipment of the United States and the percentage of hits on flying targets has rapidly mounted under these improvements.

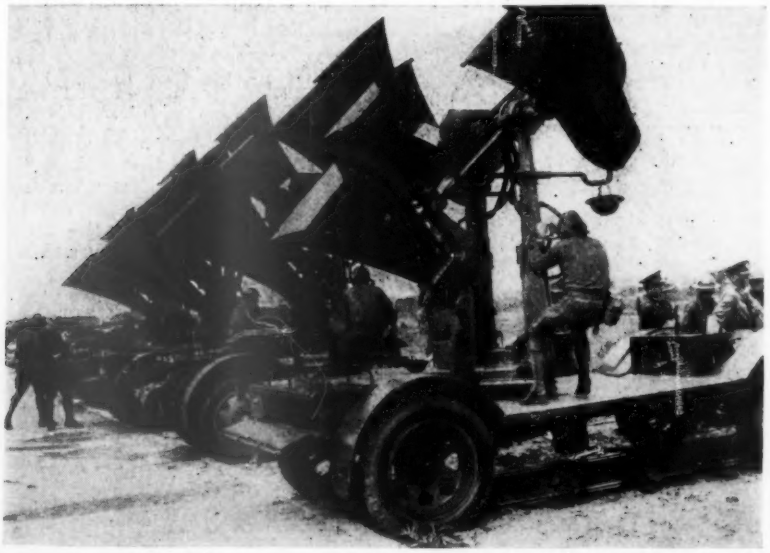


At the left are the portable 800,000,000 candle-power searchlights belonging to the Anti-aircraft division of the U. S. Coast Guard. These lights have a tremendous penetration.

Below, a comparator used for interlocking the sonic locaters and the search lights in picking up enemy aircraft.

First are the precise three-inch anti-aircraft guns which have been running up a wonderful score in target practice, and with them are the 0.30 inch and 0.5 inch caliber anti-aircraft machine guns which will make life extremely hazardous for the pilots who venture over one of the ground batteries.

The accompanying photographs show the anti-aircraft "locating" equipment of the Coast Artillery at Fort Tilden, Far Rockaway, Queens, N. Y. Here we have a battery of the tremendous 800,000,000 candle-power searchlights which can be brought into service quickly for a night-raid, and last but not least, come the sound locators that are operated in conjunction with the searchlights and comparators. These units are an accurate check upon each other in locating enemy aircraft making a night raid.



These super-sensitive sound receptors can pick up and locate the faintest whine of marauding aircraft. When the sound is once located by the above instruments the searchlights and guns can then be trained on the marauding aircraft through the comparators.

Thus, through the comparators, the searchlights can be trained quickly and accurately upon the enemy craft originally located by sound reception locaters that appear much like a group of radio loud speaker horns. While this idea is not strictly a new one, having been experimented with to some extent during the war, yet the apparatus has been so highly perfected that the enemy planes are very quickly placed within the spot of light, making a fine target for the guns.

It is said by those who should know the accuracy of this equipment, that a ship must keep well above 20,000 feet altitude to be out of the danger zone created by the ground batteries, and at 20,000 feet, the aircraft loses much of its effectiveness and maneuverability. At 20,000 feet the best of modern bombers will be at a decided disadvantage.

Streamlining Soaring Gliders

The Bens "Luftlimusine" with the wing set directly on the fuselage.

The wing of the "Austria" is carried by an extended pylon above the body.

GLIDING and soaring efficiency, even more than with the power driven airplane, depends upon drastic reductions in the parasitic resistance of the exposed structural bodies. Every ounce of head resistance that can be removed is a definite step toward improved performance when soaring.

In the two accompanying photographs, we show the latest advances in streamlining made by the German glider constructors. In both cases, the designs are very clean cut and it is difficult to imagine anything that will slip through the air more easily than these gliders.

First is the glider owned by Wilhelm Bens, known as the "Luftlimusine". The design of this soaring plane is distinguished by a totally enclosed thin pointed body, with the wing being set directly on top of the body so that the wing conforms with the upper portion of the body.

Second, is the "Austria" owned by Robert Kronfeld. Here the wing is elevated considerably above the body by a well streamlined pylon. This is an open cockpit type having a body with a decidedly ovoid form. Great care has been exercised in both cases, to merge the wing very gradually and neatly into the structural members so that the turbulence loss will be as low as possible.

In view of the care taken with the adjustment of the body outlines, it seems queer that the instruments are projected into the air-stream in such a way that they must exert a very marked increase in the head resistance.

What the Balloonist Must Carry

WHEN a contesting balloonist leaves the earth, he carries more than the average spectator realizes. He takes along more than a basket, a jug of water, food, and the sand bags necessary for proper elevation. A famous balloon racer tells us that the following items are necessary:

The net and basket. A load ring, canopy and curtains. An American flag. About 250 sand bags total but all of these bags do not go along with the balloon, for many are utilized in weighing down the balloon when it is inflated.

Here is a brief list of essentials for such a trip. About 70 cells for the batteries; radio tubes, an instrument case, radio, thermos bottles, an essential pump for the pontoon, a map table, bed, several life-preservers in case of a water landing, two scoops, several rolls of friction tape, smoked glasses, a sand trough, waterproof cover, various tools, a pocket compass, shotgun, stop watch, a first-aid kit, many pounds of drag-rope, shells for shotgun, nautical almanac, sextant, liquid compass, variometer, 400 feet of antenna wire, several parachutes, water cans, oxygen bottles, matches, pistol, sea anchor, quilt, heating pads, paper plates, shovel, salt, canned fruits and canned vegetables and various essential foods.

Add to that much courage, experience with the weight of the balloon proper, and you see the trip skyward is no light affair.

A Caterpillar Club Initiate

SECOND Lieutenant John C. Gordon, Air Corps, U. S. Army, a student flyer at Randolph Field, Texas, now understands the feelings of his more than four hundred and fifty fellow-members of the Caterpillar Club.

This is a semi-official organization of men and women who, at some time during their respective eventful flying careers, have been forced to "bail out" of their ship and float to earth with a parachute as their sustaining power.

Lieutenant Gordon's basic training plane caught fire while its occupant was practising slow rolls about one mile north of Cibolo, Texas. He was flying a PT-12 (Primary Training) at the time. The flames blew back into his face and the lieutenant realized that he had no time to lose if he wanted to get out of his plane in the raw state.

Even so, the ship had fallen about 1,000 feet before he was able to clear the ship—his metal safety belt had hampered him to some extent, and the plane was falling rapidly.

Recounting his experiences later, the officer spoke as follows: "My most trying moments were while the ship was diving, the fire was coming back at me, and my belt wouldn't unhook. Then I figured it might be better to stay up as long as I could, so I pulled the ship out of her nose dive. I mean, it was real relief when the flames shifted away from me then—I was already feeling like a well done beefsteak.

"I considered an attempt to land, but saw that the fire was around the gas tank, and there was a big chance of it exploding. My hands were severely burned, and I was doubtful of my ability to handle the controls with them. My biggest thought, anyway, was the possibility of an explosion.

"Finally, I jumped. I had no fear of that. My 'chute soon opened, and I was suspended in such position that I could watch the ship as it fell to earth, where it crashed and spouted up in an explosive mountain of flame. I fell slowly—everything seemed slow. Time seemed to have stopped, and that feeling remained until after I had been in the hospital for more than an hour."

The lieutenant landed in a bunch of mesquite, and was painfully cut and scratched, in addition to the severe burns which he had already sustained.

Pilots' Wives Don't Worry

UNLIKE wives of deep-sea fishermen who wait at the beaches for the return of the fishing boats, the wives of today's mail and passenger plane pilots are not concerned about their husbands as they fly back and forth over the airways.

A check of field stations reveals that few pilots' wives telephone plane dispatchers for plane arrivals, although the company's ground personnel is constantly in touch with all planes through the plane-to-ground radio.

Howl Department for Amateurs

Now we have arrived at the point where it is proposed that the Howlers be organized into a national lightplane association for the better protection of their interests. Most of the leaders in the field are agreed upon the necessity of this step.

AND now we have a new proposition to put before the members of the Howl Club, a plan under which all of us can be united in our efforts for gaining aeronautical liberty.

In short, this refers to the formation of a national association of lightplane builders and amateur pilots, organized to protect the amateur against the many ills that now threaten his very existence.

If you have followed this department for any length of time, you have read howls and protests from nearly every state in the Union against unjust treatment and at times they have quoted actual confiscation of property belonging to the amateur who dares to fly.

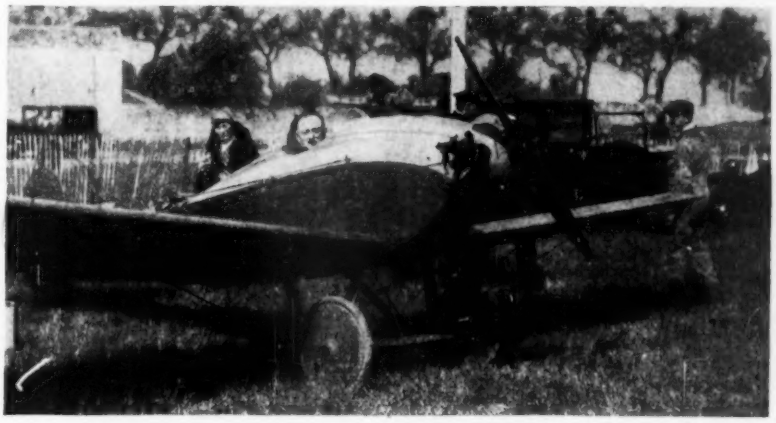
Hundreds of homebuilt planes, representing many thousands of dollars and thousands of hours of hard work, are now standing idle and deteriorating because of the czarlike attitude of the various governmental departments in this country. We can do nothing individually to remedy this matter—we can only offer an effective protest by uniting the amateurs under one strong organization and then make them listen to us.

Unfortunately for aviation, Senator Bingham was not returned to the Senate, and we had expected his support in advancing the cause of the amateur, just as he had always supported other meritorious movements in the aviation world. However, we can undoubtedly gain support from other senators if this matter is properly placed before them by a definite organization.

Leslie Long, in the December issue of POPULAR AVIATION, suggested an advisory commission as the proper beginning for a lightplane organization, and we have in view several men that we consider perfectly competent for this post. We have not had an opportunity to take up the matter with all of them personally, but we are definitely certain of the following members of this commission and we are, of course, assuming that Mr. Long would be willing to be appointed although we have not yet asked him directly.

Thus, we have Leslie Long, O. G. Corben, Lawrence J. Lesh, Howard C. Tubbs, and the Editorial Staff of POPULAR AVIATION immediately available as a temporary advisory committee for a national organization. There are ten others not yet interviewed on the subject which will bring the total number of men on the Advisory Committee up to fifteen.

And now comes the task of selecting sub-advisory committees in each state, a rather difficult task, I will confess. You fellows who are well acquainted with the amateurs in your home state, just drop us a line and make suggestions as to whom you believe will be good state representatives for this cause.



In France, these lightplanists are well organized and hold their annual contests and lightplane meets.

When we get things all organized, so that we can get into a huddle, we'll draw up that petition in jig-time and get down to some hard work. We cannot refrain from remarking at this time that the U. S. Government has recently erected a $250,000 monument to the Wright Brothers achievement, and the Wrights were amateurs just like the amateurs of today that the various governing bodies are putting out of business. Progress comes from amateur experimentation and promotion—not from the research laboratories.

And now, having got this off of our chest, we will present a few more letters to your attention from the bunch who are grounded for no good reason at all.

* * *

FIRST, out of the pile of letters at hand, come the pertinent remarks by Frank Kramer, 2718 Mont Clare Ave., Chicago, Ill., who laments the Illinois Gag Law. Listen-in to this.

Regarding your editorial in the December issue concerning Amateur Flying—a better one would be difficult to write. It is full of sensible and honest facts. It has started the old fire again that has smoldered since the new Illinois Gag Law has gone into effect.

I am a lightplane owner and amateur flyer. Having over fifty hours experience with lightplanes, it really hurts to put the ship away for no good reason at all.

I am an all around sport enthusiast and consider flying second to none; but after investing a lot of money keeping your plane in shape, then to have some swivel-chair empty-head put over a gag law for big business, that is now being enforced throughout Illinois is beyond my understanding.

They say you cannot fly identified ships, they're dangerous. If this is so, why is it most of our accidents, and if I must say big accidents, are with licensed ships?

Too bad Eddie Heath, the lightplane pioneer and our good old standby, is gone—perhaps he could teach these big business law-makers something about flying. They could stand a lesson, no doubt.

I hope in the next editorial that you publish about amateur flying you will mention that most of our country's best and ablest pilots came from small barnyard fields. But most of these airports have vanished in Illinois—gone by the law. But, that isn't all, fellows, the big ones with big business are also going on the rocks. It isn't all the depression, either.

For the good of Aviation let's hope something happens to keep some of us above water.

Wish to say before closing, that I believe there are five hundred or more amateur flyers who used to pay the doctor ten dollars per examination for permits, license, etc. Don't you think this law hurts him a bit too?

Well, let's call it a day and let the big shots do the country's flying.

Frank Kramer.

* * *

MR. J. P. BROWN, R. D. 2, Montoursville, Pa., has written his opinion, which has many good points to consider. His idea of having a lightplane design contest does not sound at all bad, although we have a

beginning along this line in our rapidly growing "Dreamship" appendix. Here he goes.

Having just read through the howl department of P. A., I am prompted to write my complaint and further to make a suggestion that might be the means of adjusting the difference of opinion between us and the Department of Commerce.

I too, had plans and a burning desire to build an airplane of my own design which, constructed of the best material, would mean a saving of approximately $125 over that of any licensed job.

Speaking of this incident from another angle it just meant that the aviation industry lost $700 from myself alone, the blame of which rests entirely on the regulations of Pennsylvania.

Basing my argument on the success of the "Pistenpol," a Ford powered plane and several others, it is only logical that such an airplane should be allowed to fly in any state. It reasons out too that any capable man should be allowed to build those same jobs from the drawings provided and be permitted to fly them.

I do not, however, favor a policy of non-restriction. We must be broad-minded enough to realize the possible failures, some of which may be detrimental to public interest in aviation. I consider the suggested rules and regulations as published in the P. A., in the recent past, regarding home-built jobs, as practical and should be vigorously brought to attention by an organized body of men. I will gladly contribute my dollar toward such a cause.

Now, that there are so many boys and young men who have their own ideas of an ideal plane, why not have a lightplane designing contest? With proper consideration on the part of the Department of Commerce a very educational contest can be had by allowing this class of men build from the winning designs.

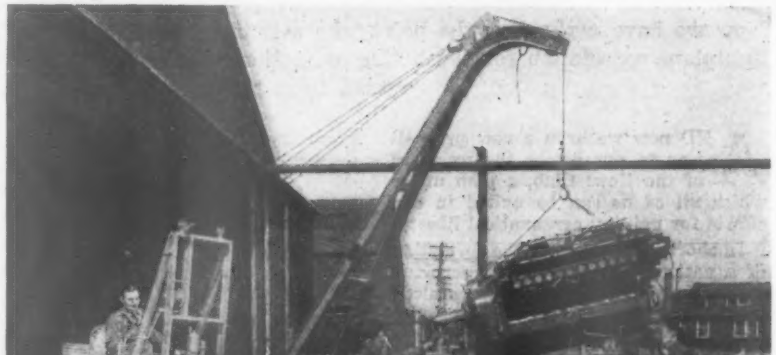
As a few rules governing such a contest, I would suggest that no age limit be had, although I would bar aircraft engineers and those in college training for same. The judges should be men in this branch of engineering who could at a glance determine, first of all, if the basic design is practical and does not offer any unreasonable structural difficulties. Then, lastly, the appearance and excellence of streamlining.

Since we have, say five plans that were accepted by capable engineers, who of course were the judges; let the college professor and students get the experience of their vocation by stressing them and make any corrections for balance, etc., if necessary.

A successful enterprise of such a kind could not help but be a potent factor in our national defense from the standpoint of equipment and personnel alike. I ascribe potential power to equipment because of factory competition brought on by the lower prices of

(Continued on page 123)

The Caterpillar Truck in Aviation



A caterpillar tractor at work around the hangars of the Government Air School, Rantoul, Ill.

MODERN methods of handling heavy airplane parts are gradually finding their way into the various airports.

The tractor shown here is in operation at the U. S. Army Air Corps Technical School, Chanute Field, Rantoul, Ill., although they have recently been placed in a number of other government fields.

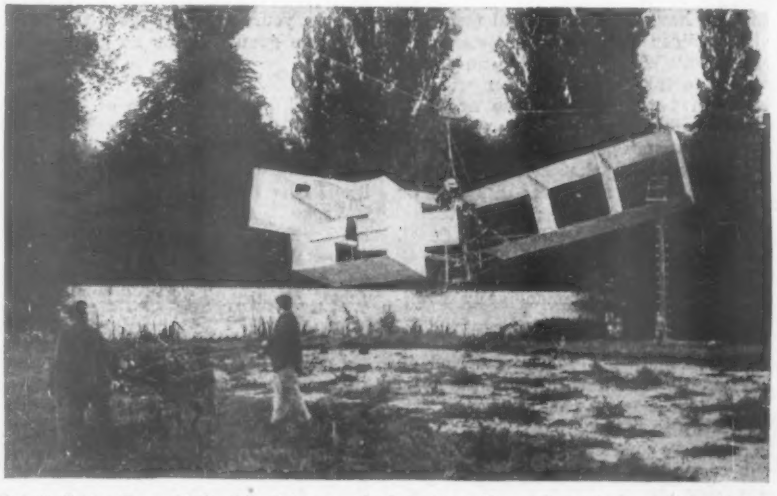
This "caterpillar" is equipped with a Willamette-Ersted goose-neck front boom derrick which, as shown, makes it easy to handle heavy engines.

Santos Dumont Tests His Box-Kite

WAY back in the time of the Wright Brothers, Santos Dumont carried on extensive experiments with airplanes in France. It is claimed that Dumont made the first flight in Europe.

Here we see an early Dumont biplane or "box-kite" being given a test in an exceedingly cautious manner by drawing it along by a donkey while it is suspended from a cableway. "Safety first" is his motto, but we wonder how any results were obtained at 2 m.p.h.

As with most early European biplanes, vertical partitions were placed between the wings which were known as "skid curtains." Their boasted purpose was to avoid side slips and skids, but they proved very ineffective.



Here is Santos Dumont's box-kite being towed along the cableway by a donkey. Some testing Lab, what?

New Canadian Testing Lab

by E. G. WILSON

An interesting and efficient aerodynamic laboratory and hydrodynamic model basin have been installed at Ottawa, Canada. Let's walk in and look around.

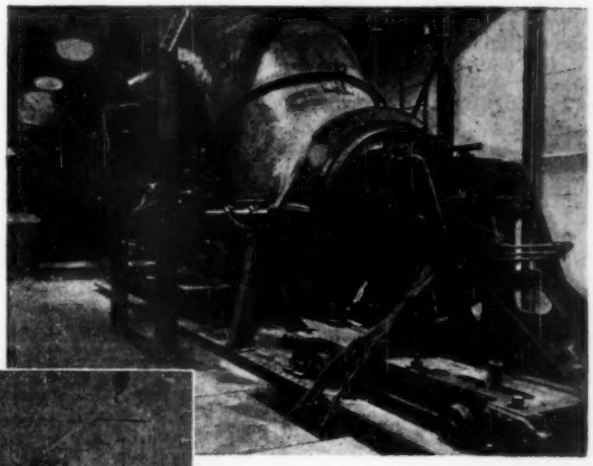
ALTHOUGH the National Research Laboratories at Ottawa, Canada, have been in operation only a short time and are not yet fully equipped, urgent work has been undertaken and valuable results have been obtained. Primarily installed for aeronautical work, the laboratories will also be useful for many investigations and tests of a non-aeronautical nature.

Because of their nature and size, the aeronautical laboratories must be housed in separate buildings and hence are not located in the main laboratory building but adjacent to it in buildings formerly comprising a lumber mill, now known as the National Research Laboratories Annex. The aeronautical laboratories include three main units:

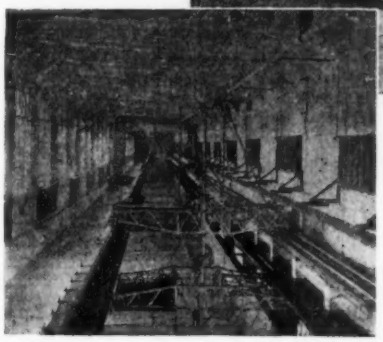
(1) In the aerodynamic building is the wind tunnel, having an air stream 9 feet in diameter with a maximum velocity of 160 miles per hour, generated by a 13 foot diameter propeller driven by a 600 horse power motor. In the air stream, the aircraft, locomotive, automobile or other model is suspended from sensitive balances. From the readings of the balances, the desired information pertaining to the full scale machine, be it the performance of the airplane or the air resistance of the locomotive or car, may be predicted.

In the case of smaller components, such as wheels, skis or struts, the actual part may be suspended in the air stream and tested under full scale conditions. The wind tunnel, designed by the staff, is declared to be one of the most efficient in existence and at the present time possesses the highest air speed of any in the British Empire.

At the right will be seen the 600 h. p. electric motor used for operating the wind tunnel. The motor swings a 13 foot propeller.



Below is the model towing basin for testing the hulls of seaplanes, flying boats and other watercraft. The towing bridge is seen standing partway down the track.



(2) A model testing basin 400'x9'x6' deep with a carriage capable of attaining speeds in excess of 40 feet per second, is housed in the hydrodynamic laboratory. This is the only basin for aeronautical work in Canada and is one of the highest speed basins now in operation in the British Empire.

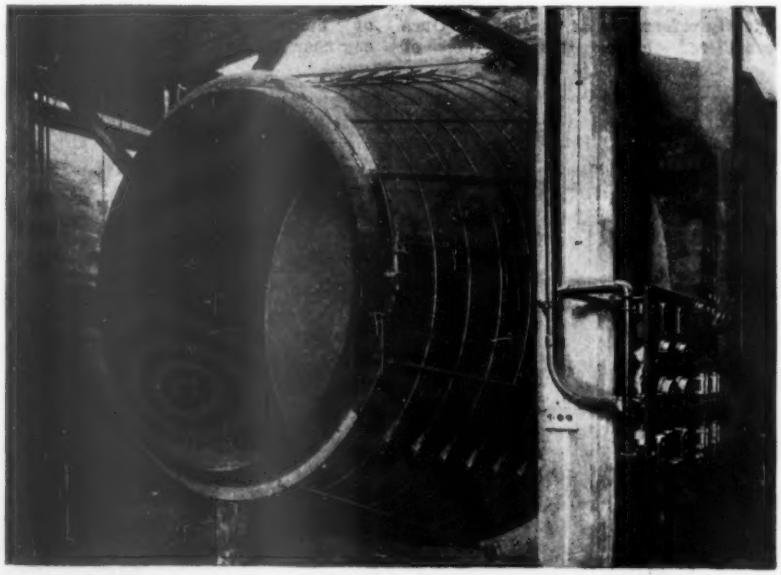
In this basin it is possible to test models of aircraft floats and hulls of normal scale to well over the take-off speed. In the basin the float or hull model is attached to a sensitive towing dynamometer carried by the carriage and is drawn through the water, the dynamometer recording speed, resistance, trim and draft while at the same time visual or photographic observations may be made of the wave formation to determine the cleanness of running and general performance.

The carriage runs on 80-lb. railroad rails, carried on H-beams which in turn rest on the cast-iron caps on concrete piers extending above the tank sides. As the speeds provided for in the design are too high to permit of securing the necessary acceleration by traction between steel wheels and steel rails, the carriage is drawn along the tank by steel cables.

The arrangement is somewhat similar to that of a traction elevator, using steel cables passing around a driving sheave at one end and an idler sheave at the opposite end of the tank. The driving sheave is driven through a speed reducer and variable-speed gear by an induction motor. Automatic control for the driving system will regulate the car's speed during acceleration, constant-speed and retardation.

(3) In the engine laboratory there is complete dynamometer equipment for testing aircraft engines of any type—air or water-cooled, tractor or pusher,

(*Concluded on page* 133)



Open end of the wind tunnel, which as will be seen, is of the wood stave and hoop type. The windstream is nine feet in diameter.

The Giant Junkers D.2500—

by
RENE' LEONHARDT

Aeronautical Engineer,
Berlin, Germany

At the left we see that the giant monoplane is equipped with a biplane tail much like that of the old Farman box-kite.

Below is shown the intersection of the body and the wing. Note the tremendous leading edge and the pinned structural members.

A GIANT airplane used on the Berlin-London route has been completed in Germany. It has 34 seats for passengers, 6 in the wing rooms in the wing leading edge and 2 in the pulpit. The crew consists of 7 men. The builder's type number is "G-38," while it bears the license D-2500.

By raising the fuselage top above the normal position, it was possible to lift both wing cabins in the rear so that normal windows with clear vision over the top of the wing could be fitted. By raising the cabins in the wing, there is a kind of between-deck which is utilized as a luggage room. The great freight rooms in the wings and below the passenger rooms are thus retained and are further increased by the rooms in the between deck space.

In front of the passenger cabins and just behind the chief mechanic's cabin, in the centre section of the wing, there is a kitchen with a pantry close by the lavatory. A second lavatory is fitted at the rear end of the passenger rooms, behind the smoking room.

A very considerable aerodynamic improvement and perfection is had by equipping it with adjustable wing flaps, according to Junkers patents.

By the adjustable wing flaps, in unison with the higher engine output, there is attained, not only a more favorable take-off and flying performance. but the landing qualities of the aircraft are considerably improved.

In addition to these improvements as to cellule and power plant, is also the equipment that has been perfected by fitting an adjustable heating and ventilation installation for the passenger cabins; walls and ceilings are provided with a tasteful, sound-proof fairing. The rear compartment is fitted as a smoking room.

The aircraft is equipped with 4 L 88/650 engines of 2600 H. P. Further performance data are given below:

Total weight	23 tons
Weight empty	16.4 tons
Takeoff run until a height of 66 feet has been reached	1890 ft
Climb at sea level	9.8 f.p.s
Service ceiling	10,200 ft., Cina rating.
Ceiling with one L 88 engine stopped, Cina rating	4,100 ft.
Climb	1.31 f.p.s.
Cruising speed	115 m.p.h.
Landing speed	58 m.p.h.
Landing distance required from a height of 66 ft. until stopped	1488 ft.

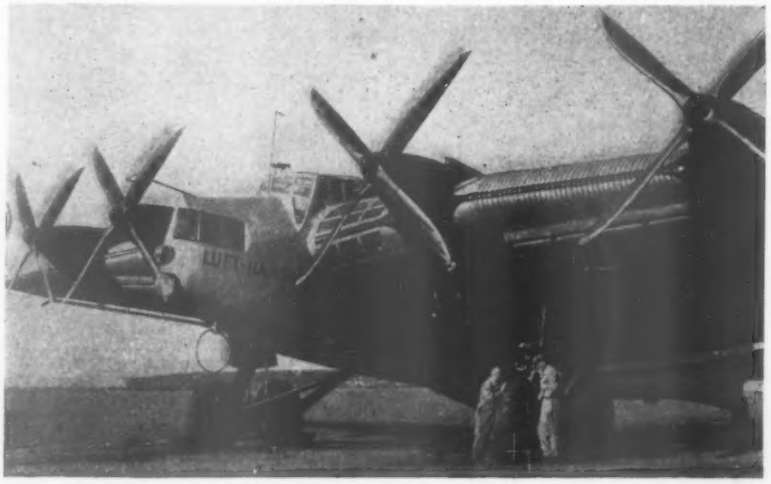
The tail group is of more than usual interest for it is of the biplane type almost exactly the same as the biplane tails of the old 1910 Farmans frequently referred to as "box-kites." Once considered obsolete this old form of tail with its vertical fins and rudders is coming back into style.

The employment of the box-kite biplane tail is obviously to avoid the structural difficulties that would have been experienced with a monoplane tail of the necessary area. Triple vertical fins and rudders are necessary, to stabilize and turn the gigantic wings about.

While nothing has been said in respect to the control system, it is quite apparent that the handling of such a large ship would be a tedious and laborious task with the usual type of manual controls, hence it is entirely likely that they are moved by a servo-motor or other form of power, and it is not unlikely that they are controlled automatically.

An inspection of the landing gear will show that the duplex landing wheels are of the tandem type instead of being placed side-by-side as in the most common current practice. While this may present certain advantages, yet it did not prevent the ship from being mired in the mud on at least one occasion. For a plane of this size, the landing wheels are of rather small diameter as will be seen when compared with the mechanics in the picture below.

There has been a considerable amount of discussion among aeronautical engineers of late, concerning the advis-



The power-plants of the D. 2500 are built into the wing where they can be serviced in flight from points within the wing. Note the windows in the leading edge.

World's Largest Landplane

THIS huge landplane, for service between Berlin and London, is to landplanes what the DOX and the Sikorsky are to flying boats and amphibians. Junkers, who specializes in giant craft, has surpassed himself in the construction of the D. 2500.

At the right is the D. 2500 in flight, where the trailing edge flaps can be clearly shown in contrast to the ailerons at the outer wing tips.

Below the nose of the D. 2500 showing the lights and the directional antenna ring below the hull.

ability of inserting the power plants within the nose of the ship as in this plane, but from the performance it would seem that this does not seriously affect the flying ability of the D.2500, at least to a serious extent.

From this example, and one or two others, it seems that Europe and America are working toward opposite extremes in respect to the number of engines employed. Here we have four power plants in the D. 2500, while in America the trend is to reduce the number of engines as in the latest Boeing transport which is a bi-motor instead of a tri-motored affair. It is a question as to which practice is the safest or best in the long run.

It will be noted that there is a semi-retreating type of leading edge employed, that is, the leading edge is square with the fuselage for a distance corresponding to the center-section, and then from this point outwardly, the leading edge retreats at a very marked angle toward the tips. While this undoubtedly presents certain aerodynamic advantages in regard to stability, yet it must complicate the structure to an unwarranted degree.

When we look at the interior of the wing and its structural members we are immediately reminded of the massive and complex trussing of a bridge or steel building. The employment of built-up compression and tension members together with this type of panel point connection is typically that of the bridge engineer. The members, of course, are special light alloys in place of the steel members employed in buildings and bridges, but the distribution of the members to receive the stresses is exactly the same.

The body before the center wing section is assembled. Note the great comparative thickness of the wing section as compared with the size of the mechanics. Note the tremendous opening left for the wing spar.

As in former all-metal Junkers ships, the sides of the body with the exception of the nose are of the typical corrugated sheet metal. It is said that this construction originated with Junkers although a similar practice broke out with one or two other builders shortly after the war.

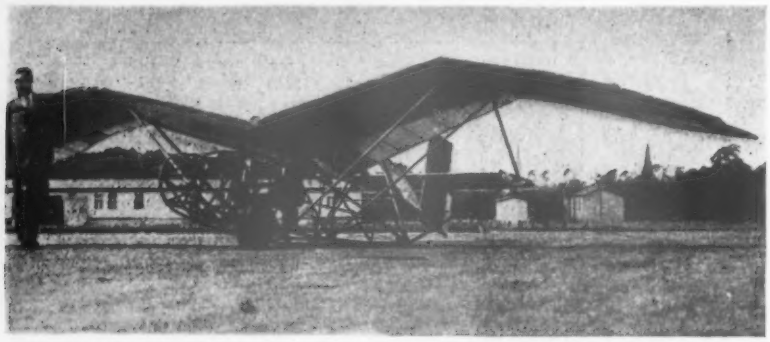
Making another comparison between European and American practice, it would seem that the present tendency of the European constructors is to maintain a cruising speed of about 115 m. p. h. and to accomodate a larger number of passengers, while in America, the tendency seems to be smaller ships and higher speeds as indicated by the new Boeing ships which are said to have a top speed of 175 m. p. h. with a cruising speed of 155 m. p. h.

Just where this part of the controversy will end, it is difficult to say, but it would seem that the cruising speeds are largely regulated by the length of the route over which the ships are to be operated, and in America, of course, the trips are so much longer that they call for higher scheduled speeds than in Europe.

The nose of the ship presents many interesting points. For example, there are good sized landing lights which are certainly to be commended. And then, just below the front end of the fuselage is the ring-like directional antenna used for locating the ship by means of radio beams. It is to be assumed that the parrot shown sitting in this circle is placed there in a spirit of playfulness rather than with a sense of utility.

Returning to the subject of the power plants, we see that there is a vast difference between the D. 2500 and the current American practice in cooling. The engines of the D. 2500 are of the water-cooled type while on American ships, with few exceptions, the air-cooled variety predominate. And thereby rises another source of argument. Of course, with wing-nose mounted engines, the large diameter of the engine would occupy such a great percentage of the leading edge as to make them impracticable.

Richter's Fool-Proof Powered Glider

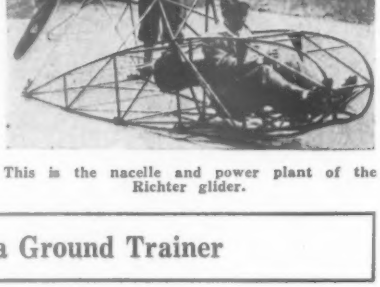


The Richter Gull Wing powered glider is a peculiar arrangement but is very stable.

HANS RICHTER, the first glider pilot to soar across the English channel and a German glider pilot of many other attainments, has recently constructed a powered glider of novel design which he intends to sell for 2,000 marks.

It is said to be automatically stable due to the peculiar arrangement of the wings, which are evidently modeled after the wings of the seagull. The power plant consists of a 23 h. p. four-cylinder engine mounted at the rear of the wings in pusher fashion.

As will be seen, the nacelle, engine, tank and the controls are all mounted in one unit so that the wings can be entirely removed without interfering with the connections and other apparatus in the nacelle.



This is the nacelle and power plant of the Richter glider.

Parachuting from a Ground Trainer

THEY are doing all sorts of stunts with ground trainers now, looping, rolls 'n everything, but it remained for one Louis "Speedy" Babbs to make an involuntary parachute leap from an Eyerly trainer. And the photographer caught him right in the act.

Babb's parachute opened accidentally and he was pulled out of the trainer as shown, causing a fall in which he was seriously injured. Better a leap from 20,000 feet than to be yanked out of a trainer in a propeller breeze insufficient to support the chute.

This is parachuting with a vengeance. A ten foot jump that is filled with hazards.

Amateur Forced to Land Plane

"COME ON, Torner, take a hop with me this morning," sang out Sergeant Orla S. Hofer.

"Thanks, Sarg, but you know I never cared much for those things'. My job is pushin' a pen."

"Yeah—I know—But you'll rust an' fall to pieces in there. The ship's waitin', and it's a perfect day for flying. Say, what dy'e think I done, so's you could go for a ride with me, huh?"

"I haven't the least idea."

"Well, son, It was a-plenty! I'd be courtmartialed if I told, so to save my skin, you gotta come."

"Well—", reluctantly, "for a friend who'll lie for me, I'll do most anything—once!" Torner climbed into the pit and his friend helped adjust his harness.

"You don't look so keen yourself, this morning, Sarg. Are you feeling O. K. for flying?"

"Sure! Only it's kinda funny—but never mind. Let's go!" And the determined Sergeant climbed up, affixed his apparatus, and in a few minutes they were high over San Diego.

Corporal Torner looked over. The Bay, Coronado and the City were clearly outlined. Further inland, mountains, orange and lemon groves and valleys were abloom with springtime beauty.

Queer, though, they began acting very strange. The whole earth was gyrating in a very unladylike manner, and rushing upward for a smack altogether too fast to suit Torner.

This being Torner's second trip in the air, but possessing keen intuition, he knew there was something wrong.

Let Torner tell us.

"I thought for a moment the Sergeant had fallen out for I couldn't see him at all. I stood up in the rear pit and looked for him. He was slumped over in his seat and his body jammed the controls.

"The first thing I thought of, I did. My hand found the rip cord of my chute. Opening instantly, the chute puffed out and pinned me there. Realizing then there was no help from it, I reached over grabbed the Sergeant and pulled him up. This released the controls. I saw he was 'out.'

"I sat down and grabbed the stick in my cockpit and began to push and pull it. I didn't know a darned thing to do, but was trying my best to do it! About 500 feet from the ground the spinning stopped. We rushed upward, and I felt thankful, but still badly frightened.

"Now that I was up, how in the devil was I to get back down?

"As I said, I hadn't the slightest idea what to do but tried to keep the stick where it was, and the ship on an even keel. We flew over the business section of San Diego. I could see the Navy landing Field at North Island and figured that was as good a place as any to crash!

(*Concluded on page* 126)

How to Start an Aero Club

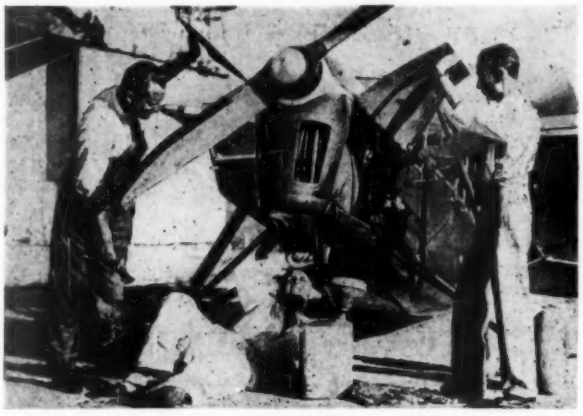
by T-2003

PART I

The way of the average aero club is not one of peace nor security, and there are many pitfalls by the wayside. T-2003, an army officer of long experience with aero clubs, gives his advice.

"HEY!" writes one lad who had devoured the November issue of POPULAR AVIATION and who had also read the article on making your aero clubs attractive, written by good ol' T-2003, "My problem isn't how to get speakers for my club, but how to organize a club in the first place. Now you tell me that, if you can."

In the light of my experience in aviation I will say this: The well operated flying club offers the best medium whereby the most flying hours per dollar may be obtained as well as the most fun per hour.



Working members are the life-blood of any aero club. Beware of the other kind, even though they are pleasant chummy chaps.

Notice that I specify the "well operated club"—the other kind is nothing but grief. For the next few few columns I am going to be a cynic and a pessimist. If you are interested in an aero club but don't want to read the following paragraphs, then my advice is don't organize the club. Getting a club together is a lot harder than suffering through the next few paragraphs.

Here are some facts, sad but true, which should be called to everybody's attention before any mention is made of how to form an aero club.

1. Wherever there are money matters involved, you will be apt to find crooks—to call them by their right names—ready to get their hands on the club funds.

2. You can't expect to learn to fly for 10c weekly dues, yet the idle penniless lad is the one who is strongest for the organization of an aero club.

3. Aviation, like the circus, seems to have attracted a bunch of loudmouths who would sooner talk than work, and no club founded by those big-talk-no-work boys will pan out.

4. The charter members might be the most earnest lads alive, but what a temptation it is to take in the wrong crowd, the good fellows, the affable lazy well-liked tramps.

5. If you own an airplane and are content to rent it out at no profit, but no loss, considering hangar rental, depreciation, maintenance, running expenses, etc., what would you charge? That's just the amount that the club will have to pay to fly its own plane.

BY THIS time you are ready to say, "I know all that, I figured everything out. We have a good bunch of boys here, how can we help but succeed?" Well, I have seen or heard of many aero clubs starting up with a fine flourish of words. Some panned out,—many are still going along. Others blew up, and I could have told them that they would blam but why butt in?

Others that I were sure would succeed went on the rocks. They had everything planned well, were a pretty good crowd, knew what it was all about—yet let me describe what happened to almost a score of clubs that I know about.

THERE is no Royal easy road to success with any aero club. It calls for hard work, intelligent supervision and a considerable sum of money—in hand, not promised.

First of all, the club must protect itself by insurance against claims for damages by the public and even from the members. Second, a good club manager must be selected.

1. The first crash, costing $190 for repairs, came while the club was ill prepared to pay for it. Two weeks later, the popular club President was killed. Everybody lost heart.

2. The club Treasurer, a business man previously thought honest and reliable, committed suicide after a business failure, and no one could find a trace of the $1,875 club fund just when they were ready to buy a ship.

3. Charter members, after organizing the club and being almost given a slightly used $4500 ship for $850 at an auction, raised initiation fees for newcomers to $200. No new members came in however, and the club died of dry rot.

4. The town's three major industries shut down in 1930, just when practically all members were worried about their jobs, and then someone stole the ship and wrecked it.

5. Fire burned down the hangar-clubhouse and burned up most of the plane.

6. Out of about 34 members, only a dozen were serious workers. The others worked only when the weather was O. K.

7. Too many girls in the club, nice girls too, thought it would be "too cute for anything if we all could learn to fly." Said a disgusted male ex-member later on, "It turned out to be a social club." His earnest sister added, "I don't want to be catty but tell him, Tony, about only three of the girls ever coming down to sew the wing fabric and they darn near ruined *my* sewing machine."

8. Three or four members were fairly good pilots with transport licenses and they, of course, hogged the club plane on pretext of test flights, or just flew cross-country with some student before the student knew what it was all about. They didn't stick to it and really instruct the other members so everyone got sore about it, Exit club.

9. Made the dues too painless, although everybody could afford more, and they were two years getting money for their plane. Meantime, enthusiasm waned and a hard Minnesota winter with little flying caused the loss of many members.

10. Instructor soloed students too soon because everyone resented adequate instruction. (You guessed it—too many crack-ups.)

11. Two instructors. One was good but few liked him. The other was a fine feller but a terrible instructor. The dour members took to the sarcastic egg who really could instruct, while the regular guys and the girls took to the fine feller.

"There must be something wrong," explained one easy-going member to me when the club was getting rocky, "Seems like only the dumb ones are passing the Department of Commerce tests. That sour egg with the nasty

tongue must have a drag with the inspectors—they pass all his students." (Oh, yeah?)

12. The entire club membership, saw three members in the club plane crash and burn up.

13. The club was organized by a group of hardworking lads who did such good work (they built their ship in one month after organizing) that it attracted the attention of several wealthy townspeople who donated a clubhouse, a hangar and another airplane.

Such prosperity, in turn, attracted a bunch of grafters and drones. The club wore out the two ships, then instead of building or raising money for new ones, the new club members looked to their benefactors for more aid which was wisely refused.

14. Out of 22 members, 6 had their private license in two months and 2 others their L. C. license in 6 months. A good record. The licensed members then "got disgusted with aviation" because they couldn't get pilot's jobs with airlines, and discouraged prospective new members by their down-in-the-mouth grumbling.

15. Had a fine and experienced instructor who was available late afternoons and all Saturdays and Sundays for $2.50 an hour. Then a member got his L. C. license and the club used him for instructor at lower rates. Result—poorly trained students who were always crashing.

16. The organizer was not a good executive and became jealous of the next president who succeeded him. The latter was clearly the better man and was getting the club on a business basis. The club was two years old, had a nice little ship and was getting along fine.

On the third election, the club's founder ran again for president, got sore at losing the election, bucked the whole outfit and got a big following of lamebrains. The wise ones withdrew from the club when it came under the control of the founder again and by this time everybody was bucking everybody else. This club just blew up.

17. The club was underway for 6 months and owned a $2200 equity in a $3500 ship, the manufacturer or finance company holding the balance on notes. The motor cut out on a take-off, the instructor grabbed controls and brought ship down in the only available space—a road: It wrecked two parked autos the owners of which successfully sued the club.

Fortunately, the club was incorporated and the individual members could not be touched.

The ship was insured against damage to itself but the legal fees and the judgment for the two suitors ate up almost all of the $1700, which the insurance company allowed the club. Fortunately this club revived itself and is now going ahead strong.

(*Continued on page* 128)

Armed Guard Protects Pigeons

U. S. Army Air Corps Photo

Here is the hawk that nearly cleaned out the Signal Corps pigeon loft.

AFTER marauding hawks, owls and other birds of prey had made several vicious attacks upon valuable homing pigeons at the Army Signal School lofts at Fort Monmouth, New Jersey, it was recently found necessary to post a soldier-guard armed with loaded shotgun near the lofts to forestall further losses.

"Pride of Monmouth," a prize-winning pigeon, was attacked recently by a huge hawk which actually followed the bird into the loft's entry trap. The hawk seized the bird, jerking its head from its body and stripping the flesh from its back in an instant.

A Signal Corps pigeon man was in the loft at the time and he, too, was attacked by the invader and suffered deep cuts and lacerations about his face, hands and arms. He stunned the hawk with a blow of a stick and, still alive but securely confined, the bird is on view at the Army post. "Pride of Monmouth," at the time of its death, was being used in important experimental flights along the meridian.

Still more recently, an owl seized and killed "Evening Star", a night flying bird which was approaching the loft. The unwise owl flew into a nearby tree and was shot by a member of the pigeon detachment.

The only two World War messenger bird survivors, "Molly Pitcher" and "Spike", with "Florence Nightingale", heroine of a flight from Lookout Mountain last spring, were in the loft at the time of the hawk's invasion, and would possibly have been killed had not the soldier been with them.

Pigeons will undoubtedly see more service in aviation as guides for lost planes and for other purposes, and when this comes to pass, more effective means of protection against hawks must be devised. At the same time, the menace of owls must be eliminated if the pigeon pilot is to be secure.

Insurance Companies Alter Their Attitude

THE old bugaboo of "How does flying affect my life insurance?" has been removed by insurance companies as a result of the operating record made by companies flying licensed planes with licensed pilots in regularly scheduled operations.

Several years ago, most life insurance companies would not pay the face value of a policy if death occurred in an airplane accident. Today, the majority of companies make no prohibition against air travel, either in policies already in effect or which are now being written.

Twenty-four out of twenty-five companies questioned stated their policies covered passengers traveling on a regular transport air line. In addition to paying the full face of the premium in the event of an airplane accident, approximately half of the companies, answering the questionnaire said they would, in addition, pay the double indemnity provision.

One company wrote: "Of the millions of policies in force issued by this company, less than 1,000 contain an aviation rider. None of these 1,000 riders are concerned with passengers traveling in regular scheduled transport operations."

Another evidence of the changed attitude is the sale of travelers' accident insurance, as rail and steamer accident policies are sold.

Group insurance is also being written on air line employees, at a rate substantially that prevailing in other occupations, with no limit fixed on the amount of travel by air on the part of these company employees.

Dainty Little Air Balloons

HERE we see an installation of air balloon tires as mounted on the Ford trimotors operated by the American Airways. There is a maximum of tire with a minimum of wheel which should be a decidedly effective combination for absorbing shocks.

This job is nearly all tire with very little wheel.

A Novel Plane Makes Debut

by FLETCHER PRATT

Paris Correspondent of POPULAR AVIATION

This novel variable wing area plane has a very extended speed range and is of great interest to those who have endeavored to combine a high top speed and a low landing speed. In many respects it resembles the ship proposed by J. B. R. in the January issue of P. A.

THE splendid results of the Gerin variable wing surface models, when tested by the French Air Ministry recently, together with the fact that the first full-size Gerin plane now under construction will take to the skies next spring, seem to indicate that aviation will soon be familiar with a type of machine as startlingly original as the autogiro when it was first launched some years ago.

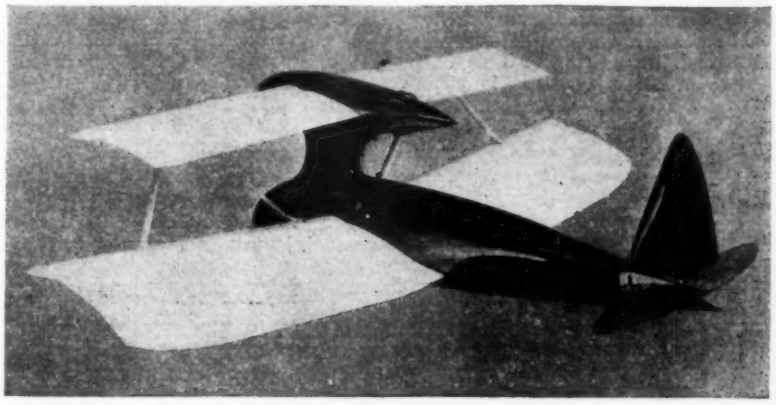
The principle of the Gerin Variable Wing is old but the practical working out is entirely original and as the French Air Ministry tests reveal—practical. In a nutshell, it consists of an airplane whose wing surface is varied automatically.

With the small wing surface, resistance is practically nil and enormous speeds can be attained without any increase in lifting power. When the wings are extended to their full size, the Gerin machine can take off in safety at low speed and can land at a dead-slow speed that nothing but an autogiro can approach.

The designed high speed of the machine now under construction is 204 miles per hour and this machine, which nothing but the fastest racers can approach, will have a landing speed of less than 40 miles an hour. Tests of the French Air Ministry show these performances to be perfectly attainable with the 120 h. p. Salmson that will be mounted in the ship.

The essential part of the Gerin machine is the wing. This wing is supported on a pair of streamlined longerons and internally carries a heavy chain which supports fins perpendicular to the length of the wing. They are made of metal and interconnected, but not rigidly.

These fins support the surface for the wing at its fullest extension, in which state they are covered with a doped fabric. Fabric and fins, in fact the whole extensible portion of the wing, are rolled on a drum in a compartment in the fuselage.



Three-quarters view showing the inverted sesqui-plane arrangement of the wings, a design now becoming popular.

The fixed portion of the wing consists of a number of streamlined caissons covered with duralumin and threaded on the longerons. When the wing is spread to its full extent, the additional portion is simply run along the chain.

These additional surfaces when unrolled comprise about two-thirds of the total supporting surface of the wing. In the machine now under construction, the fixed portion of the upper wing is 14 inches deep; the whole wing, with the sliding surfaces added, 42 inches.

The lower wing has a fixed portion of the same depth, with considerably greater added surface; the whole depth of the lower wing being 72 inches.

The unrolling of these surfaces is entirely automatic. In addition to the air-speed indicator the machine is provided with a "critical speed" indicator. The take-off is made with both wings unrolled to their full extent to give the full supporting surface at low speed.

As the airplane picks up speed, the air-speed needle crosses the critical-speed line, whereupon an electrical connection is closed, a white-light on the pilot board is illuminated and the extra-surface of the lower wing is rolled into the fuselage drum automatically. With only the upper wing unrolled, the plane makes greater speed, and as it continues to gain in velocity, the critical-speed lamp lights again and the extra surface of the upper wing rolls up automatically just like the lower wing.

When the airplane is about to land, or in case of a stoppage of the motor for any reason at all, the needle of the air-speed indicator drops. As it crosses the line at which the reduced wing surface is no longer sufficient to sustain the machine in flight, a red light is illuminated on the board and the extra surface of the upper wing unrolls automatically. If the speed continues to drop the lower wing also unrolls in the same manner.

Tests show that the upper wing will unroll to its full extent in flight in 15 to 20 seconds and that the lower wing, because of its greater length and weight, in 20 to 25 seconds. The reverse process is accomplished in somewhat less time than this in each case. Heavy air pressures do not affect the

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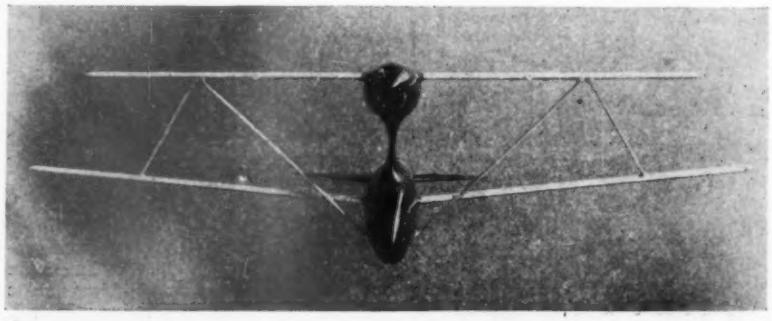


Front elevation of the Gerin plane showing its clean cut lines and the semi-Warren wing bracing.

Teletypewriter Transmission is a Success

TESTS conducted by the Aeronautics branch, Department of Commerce, prove that transmission of weather maps over the teletypewriter circuits of the Federal airways system is practicable in every way.

Maps were transmitted in this way with complete success over an experimental circuit which included five airports and the Washington office of the airways division. This service was maintained for five months and maps were sent three times each day. In practice, when this system is put in service operation, transmission can be speeded up and maps sent probably eight times a day at three-hour intervals.

At present, the information shown on the maps is sent on the tapes of the teletype system and pasted up in the radio, pilots' rooms or operations offices of the airports. Federal aeronautics officials felt that it would be a distinct forward step if this information could be shown on an actual map in graphic form. The successful experiments embody the working out of this idea.

The new type maps, which are printed by automatic telegraph typewriters on sheets of paper rather than on the tape which now is in use, show barometric pressures and areas of low and high pressure, as do the general maps issued by the Weather Bureau, but with the added advantage of giving information an hour or less old. In addition they give the weather conditions at airports where data are collected, showing ceiling, general conditions—whether it is clear, cloudy, overcast or if rain, thunderstorms or snow are present—visibility, temperature, wind direction and wind velocity.

Aeronautical · Oddities ——— by MARINAC

CLYDE E. PANGBORN'S FLYING CAT "FLIPPER" WHILE IN FLIGHT OVER TETERBORO AIRPORT, GAVE BIRTH TO THREE MORE MASCOTS!
R.L.R. ATCHERLY, OF R.A.F. SAYS 332 M.P.H SPEED FLYING IS ABOUT AS THRILLING AS DOING 65 IN AN OPEN ROADSTER
FRITZ SCHINDLER, CIRCUS STUNT ACROBATS' CONTRACT REQUIRES HIM TO GO UP DAILY RAIN OR SHINE!
ON ROGER Q. WILLIAMS' NON-STOP FLIGHT TO BERMUDA, DURING THE ROUND TRIP HIS PROPELLER WAS RIDDLED BY RAIN DROPS!

Testing Strength by Bubbles

WOULD you stake your life on the strength of a bubble? No, of course not, but that is what aviators in the United States Naval Air Service are doing every day of their flying lives.

An aviator's life depends, literally speaking, on the strength of the wing construction of his plane. When scientists of Forest Products Laboratory, Madison, Wisconsin, recently devised a test for measuring the strength of wing construction they picked, of all imaginable materials as basis for their test—a mere bubble.

Wings of planes in flight have been known to crumple without any apparent cause, resulting in the death of the occupants. Many of these accidents are thought to have been caused by a sudden twist combined with a severe stress and an inherent weakness in the material.

To determine the strength of struts, spars and other wing material before they go into wing construction was the problem of the navy airmen. If they could devise a test which was anywhere near perfect, they believed that they could eliminate most of the air accidents due to faulty wing material. Baffled they turned to Forest Products Laboratory—and here they found the answer to their problem.

Resorting to everything in mathematics, mechanics, and physics the research men at the Laboratory finally found their clue in bubbles. Other methods had proved inefficient and inaccurate. Some radically different method had to be devised.

Buried between the dusty sheets of an old physics manual, the research workers found their clue. Here was recorded the discovery of the curious fact that the twist (torsional) resistance of a solid beam is in direct proportion to the air capacity of a bubble of the same size and shape as a cross section of that beam.

With relentless persistency the men on the research staff checked and rechecked this law, tested it and experimented with it until they were satisfied it was an almost perfect test. Holes the same size and shape as the cross section of the beams to be tested were cut in aluminum plates. Bubbles were spread over the holes and inflated slightly so as to make them take a flat pin-cushion shape.

The volume or air capacity of these bubbles was measured by contacts having sharp pointed micrometers. By comparing the bubble volumes, the twist resistance of each beam was determined. Best of all, the test proved itself 96 per cent perfect. The navy airmen's search was at end.

Later a special solution of triethylamineolate, water and glycerine—which makes a tough bubble—was concocted to eliminate the easy breakage of the bubbles. The tougher bubble also added a great deal to the efficiency of the test.

Pop AV Feb 33

The Success of Air-Cooled Racers

by HERBERT F. MADEN

A summary of noted American speed planes that have employed air-cooled engines. The features of these machines are described in detail with remarks on their performance.

THE first air-cooled racer, and the one that started the interest in this type of plane, was built in 1929 by the Travel Air Co. It was the Travel Air Model "R," probably better known as the Mystery Ship.

It caused quite a sensation when it won the Free-For-All at the National Air Races with an average of 198 m. p. h. in spite of the fact that the pilot cut a pylon and had to remake it. This was the first time that a commercial plane had won the Free-For-All over the military pursuit planes.

The Model "R" was a low wing monoplane of steel tube and plywood construction. It carried the newly developed N. A. C. A. cowling and the new Wright J-6 motor supercharged to 400 h. p. It had a wing span 28' 4" and weighed 1,465 pounds empty. The high speed of 228 m. p. h. was attained.

The performance of this plane was remarkable. The intense interest that it aroused both among the general public and industry alike probably did more than any other single factor to revive the interest in racing planes, which had for some time been latent.

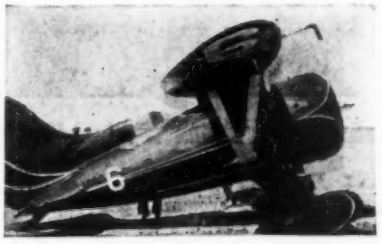
The Travel Air company also built a few planes similar to the Model "R" but equipped with lower powered motors of both in-line and radial type. However, due to the smaller power, the performance of these planes, although good, did not compare with that of the Model "R". They also redesigned the latter ship making it slightly larger but using the same motor. Several of these new planes, the Model "S", were sold in the U. S. and one was sold to the Italian government.

The Model "S" was similar both in appearance and construction to the Model "R" but had a wing span of 29' 2". Powered with the same Wright Whirlwind motor, it had a high speed of 240 m. p. h. and weighed 1,470 pounds when empty.

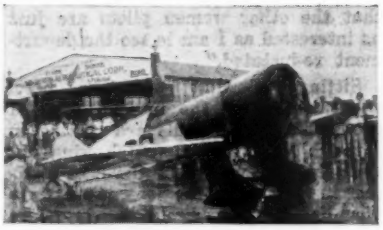
The climb, 3,200 feet a minute, even to-day, is exceptional. Probably the best known of the Model "S" planes is the Texaco 13 which was flown by Frank Hawks setting two transcontinental records, one of 12 hours, 25 minutes; and numerous intercity records both here and abroad. In the six months, beginning in July 1930, Capt. Hawks flew this plane 25,409 miles at an average speed of over 200 miles per hour.

The Free-For-All was changed to the Thompson Trophy Race in 1930 and trophies were offered by Charles E. Thompson to the winners. This race, by the way, is a hundred mile closed course event and is open to any type of plane.

The Gee-Bee Type R-1



The Springfield Racer



The Wedell-Williams Racer

The E. M. Laird LC-DW-300

The Gee-Bee Type R-2

The E. M. Laird company designed and built a small biplane, the LC-DW 300 for Lee Schoenhair, to be flown in the Thompson Race. It had wing spans of 21 feet and 18 feet and was powered with a Wasp Jr. (300 h. p.) motor. It weighed 1,380 pounds empty.

Ben O. Howard, a pilot on the Universal Airplanes, in his spare time built a low-wing monoplane powered with a 90 h. p. Wright Gipsey in-line motor. This little plane, the Howard DGA-3, had a wing span of 20' 1" was 6' 9" high and 17' 9" long. It weighed 635 pounds empty and had a high speed of about 200 m. p. h. Considering the low power, the performance of this plane was outstanding and it caused as big a sensation at the 1930 Races as the Mystery Ship had done on the previous year. Howard won over $6,000 in prizes, winning five first and two third places.

Another entrant, the Curtiss XF6C-6, was not an air-cooled racer but because it was entered in the Thompson Race and stood a good chance to very materially affect that race, I shall include it.

It was entered by Capt. Page and was a stripped down Curtiss F6 navy fighter, a parasol monoplane with a wing span of 31' 6" and was powered with an 800 h. p. Curtiss Conqueror water-cooled motor.

This plane was by far faster than any air-cooled racer and had it won, the average speed would have been close to 300 m. p. h. with the probable result that designers would have turned to the water-cooled racing plane as 300 m. p. h. was believed to be almost impossible for an air-cooled plane at that particular time.

Capt. Page unfortunately crashed during the race and Charles "Speed" Holman in the Laird won first place with an average of 201.9 m. p. h. James Haizlip in a Travel Air "S" was second with an average of 199.8 m. p. h. And Ben Howard was third with an average of 162.8 m. p. h.

In order to increase the interest in cross-country flying, Vincent Bendix offered trophies and large cash prizes to the winners of (what was before) the Non-stop Derby with an extra prize to anyone who continued on to New York to break the transcontinental record. The Bendix Race is open to any type of plane and is flown, with or without stops, from Burbank Field, Calif., to Cleveland, Ohio.

The Cleveland Speed Foundation ordered a Laird Super-Solution, similar

to the LC-DW-300, to be flown by James Doolittle in both the Bendix and Thompson Trophy Races. The Laird LC-DW-500 had the same general dimensions as the LC-DW-300, but was cleaned up considerably and equipped with complete navigating instruments. It was powered with a Wasp Jr. engine supercharged to 510 h. p. and weighed 1,580 pounds empty.

The rest of the entrants in the Bendix Trophy Race were the commercial Lockheed Vega and Orion planes. Both are seven place high speed transport planes. They are powered with supercharged Wasp motors and are used on numerous airlines throughout the U. S.

The Vega is a high-wing monoplane with a wing span of 41 feet and it is 27'6" long. It weighs about 2,500 pounds empty and has a high speed of some 200 m. p. h.

The Orion is a low wing monoplane with a wing span of 42'10" and a length of 27'6". It weighs 3,200 pounds empty and has a high speed of 220 m. p. h.

James Doolittle won the Bendix Race with an average of 223 m. p. h. and continued on to New York to set a transcontinental record of 11 hours, 16 minutes. I might mention that this race was won in 1930 by Wiley Post in the famous Winnie Mae with an average of 190 m. p. h.

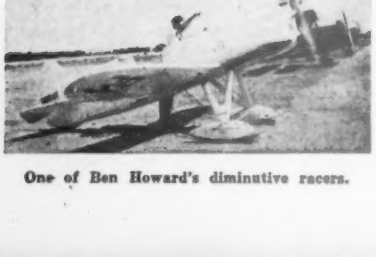
Granville Brothers built for the Thompson Trophy Race, a sturdy low wing monoplane, the Gee-Bee Model "Z," which was more or less a development of the commercial Senior Sportster "Y." It had a wing span of 23'6" and was 15'1" long. Powered with a 535 h. p. supercharged Wasp Jr. motor, it had a high speed of some 280 m. p. h. weighed 1,400 pounds empty.

The other entrant, the Wedell-Williams Special, was more or less a conventional low wing monoplane with a wing span of 26'2" and a length of 21'3". It was also powered with a supercharged Wasp Jr. motor.

Lowell Bayles, in the Gee-Bee, won the Thompson Trophy Race with an average of 236.2 m. p. h. He later

(*Concluded on page* 120)

The Keith-Rider Ship



One of Ben Howard's diminutive racers.

THE AERO-SPORTSWOMEN

By JOAN THOMAS

Amelia Earhart Putnam smiles as she reviews women's activities in aviation.

"I AM glad to see that you have started a woman's page again," said Amelia Earhart as she sat discussing women's place in aviation with the editor of the Aero-Sportswomen.

"I read POPULAR AVIATION regularly," she continued, "and I am sure that the other women pilots are just as interested as I am to see the department re-instated."

Sitting in that luxurious hotel apartment, with the muffled hum of the traffic on the boulevard coming in through the windows and looking out over the blue waters of the lake glinting in the sunshine, it was hard to visualize the long, cold, lonely hours of that night over the Atlantic—the price of a magnificent adventure!

But purposely I did not ask any questions about it, for I imagine Miss Earhart is so tired of the same old queries about—"how she had the courage to do it!—was she scared when she saw the flames shooting out of her engine—or if she really killed a cow when she landed in Ireland?" that she probably wishes she had never seen the Atlantic, much less flown across it.

"There is a place for women in aviation, just as there has been in every other business," she said, as she gazed down at the long, slim fingers of her capable looking hands. Then pushing back the mop of short curls, her grey-blue eyes serious and thoughtful, she continued, "it takes time to develop such a place in any new field, but it will be done of course!"

"Do you think there is any particular value in women attempting new records—such as endurance flights?" I asked.

"Yes, even if they don't seem to advance aviation, I think they should be continued," she said. "I hope the girls will keep trying for new ones. Every record adds to the public confidence in the use and safety of aircraft, and will forward the time when flying will be as common as any other mode of travel."

"European women have done some splendid things in long distance flying; Amy Johnson as you know is an outstanding example. They also hold the altitude record. I doubt if we have any equipment in this country that can equal Miss Rue's record in France, but I hope one of our pilots will try for it anyway."

"Someone with experience!" she added quickly. I think she mistook the twinkle in my eye for ambition. I explained that I was only an amateur flyer, but that I am keenly interested in the possibility of helping to develop publicity and personnel work in aviation. Other business organizations have found it to be an important factor —not only from a psychological standpoint, but that it is sound economics as well.

"That is a splendid idea," she said, "a couple of the transport lines have women acting as hostesses on their planes, but of course that is only one small phase of the problem. Yes, there should be some interesting opportunities for women in that line."

"Then any publicity—such as your page in POPULAR AVIATION—will have its effect. It keeps up interest among women flyers, who in turn will interest others. When I took up flying I saw that the idea of flying had to be sold to women. During the first women's air derby, women would come up and touch a plane reluctantly as if they were afraid it would explode or bite them.

"And at the time of that first derby in 1928 there were only thirty licensed women flyers in the United States. In four years time that number has in-

(*Concluded on page* 126)

Two members of the Akron Girls' Flying club known as the "Brigade of Death."

Simple Lessons in Meteorology

by JAMES A. SIMPSON

PART V.

Charley gives Jim some good hot dope on temperaure variations, altitude and the stratosphere.

Dear Jim:

The only thing I have missed so far in this one-sided correspondence of ours is a real honest-to-gosh opportunity to find out at first hand how much you have assimilated of the meterorological dope I have been dishing up for your edification, and, I imagine, amusement.

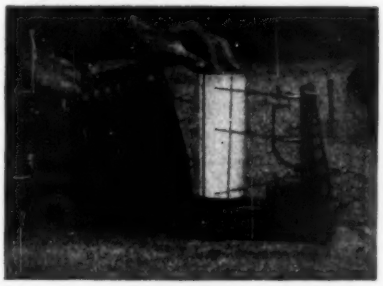
The other day I sat in an interurban for two hours listening to a small boy recite his multiplication tables to his dad. At first I felt like getting up and taking another seat, because the kid's "tootums two are four, tootums three are six" sort of got on my nerves. But as I listened to him rattle them off I got plumb fascinated. I imagine I was just as much interested as the boy's father, because I, like him, was anxious to find out if the youngster would slip.

And do you know, Jim, the boy went clear to seven times nine before he made a mistake. "Pretty good!" I said to myself. "I wonder if Jim could rate as good an examination on meteorology?" And I sort of hankered for a chance to back you up in a corner and ask you a few.

So far, Jim, we've considered pretty practical things, and have managed to duck the theoretical, but the time has come to dig into the old text books on various meteorological theories that explain, in part at least, some vital meteorological facts. For example, with a given high pressure area on your weather map and a given low pressure area, it seems logical to assume that the difference in pressure would cause a wind motion to be set up that would travel directly along a great circle from the "high" to the "low."

Which the same it does not. As a matter of fact, the earth's rotation has a pronounced effect upon the direction of the wind. This rotation of the earth, which even the depression and the recent election haven't been able to stop, causes the wind to flow *around* high or low pressure areas in accordance with fairly well defined laws. For example, when you are facing the wind in the northern hemisphere, the lower pressure lies to the right, and the higher pressure to the left.

In the southern hemisphere the reverse is true. Without going too deeply into the reasons why this is true, it has been discovered that moving particles of air (wind to you, Jim), tend to be deflected to the right by the earth's rotation, if blowing north of the equator, and to the left if south of the equator. To quote from our admirable text book: "This deflection will continue, except as modified by disturbing influences such as surface friction,



A meteorograph that gives three readings simultaneously.

turbulence and topographic barriers, until a steady state is reached, when the pressure difference normal to the ideas of the particle (of air) just balances the influence of the earth's rotation, and the moving air is blowing along the isobars.

The difference of pressure in a given horizontal distance perpendicular to the isobars is called the "pressure gradient." After thinking that over for a while I believe you will—in time—understand just why this is so.

To sum up briefly what I have tried to outline at considerable length, the free-air motion in the northern hemisphere is clockwise around a high pressure area and counter-clockwise around a low pressure area. The reverse, of course, is true in the southern hemisphere. A low, or storm area, is called a cyclone. The circulation around it is known as cyclonic. A high is known as an anticyclone, and the circulation around it is said to be anticyclonic.

It is interesting to note, Jim, that while modern science has been able to dig up and understand the reasons for certain meteorological phenomenon, laymen have known most of the facts for quite some time—possibly a few hundred or a thousand years.

For example, ask an old sailor the direction of the storm center and he'll tell you it lies ten points to the right when facing the wind. Just an old Spanish custom, probably, that helped Chris Columbus get across, and that no doubt was known to the sailors on the Mediterranean five hundred years earlier.

Jim, do you recall the old boy who made the aluminum sphere and hitched it to a balloon and went for a joy ride up in the stratosphere? A year or so ago, wasn't it? Well, a lot of people were amazed to learn there was such a thing as a stratosphere. Most of them hadn't bumped into it before. (I don't believe the professor had, either.) Any schoolboy knows that there is a variation in pressure of the atmosphere based upon variations in altitude, but blamed little was known about the temperature of the upper air until a mess of balloon soundings were taken.

Then it was discovered that up to about 7 miles the temperature falls 1 degree for each 300 feet of altitude. This seven mile layer is called the troposphere. Above that layer is a belt called the stratosphere where the temperature remains practically constant with an increase in height. The scientific name for the surface or level where the stratosphere and troposphere shake hands is the tropopause. Don't ask me why, because I don't know. Now, Jim, this tropopause is higher above the equator than at the poles, is higher in summer than in winter and is depressed over cyclones and elevated over anticyclones.

Now for some useful rules. Up to 1500 feet when the wind shifts it shifts to the right in the northern hemisphere (to the left in the southern) and approximately doubles its speed. Above 1500 feet the wind shifts to the westerly on the poleward sides of the tropics and the easterly on equatorial regions. However, this rule is not hard and fast for any particular day, as you may encounter easterly winds up to 15,000 feet in the middle latitudes and even bump into westerly winds at high altitudes in the tropics. Surface winds generally veer to westerly in a clockwise direction when blowing from the east and south of east, as altitude is increased, while if from north of east the wind backs counterclockwise to westerly as altitude increases.

When you get up close to the tropopause (personally, I don't think you'll ever make it, Jim, until your number is called, for it's 30,000 to 40,000 feet up) you encounter the "big wind," blowing at an average velocity of 60 miles per hour from the west. If a fellow could get up there and stay there long enough with plenty of gas, I'd say he could go places, if headed for points east!

Next time I'm going to tell you a little more about cyclones and anticyclones, so that if you should chance to run upon one by mistake you would know it when you saw it. Meanwhile, give my regards to the gang and tell 'em the season's greetings are on me, but they'll have to supply their own hospitality. And that goes for you too, you long-legged Ovis Poli!

Yours,
Charley

Photo Phans Club

YESSIR, the old Photo Phans Club is coming right along. If you don't believe it, just look over the advertisements in the Barter and Exchange Department this month.

Now, unfortunately, there were more ads submitted than now appear in the B & A, but we were compelled to sidetrack them for the reason that they contained the fatal words, "will sell" or "will trade for 10c." We cannot permit any cash selling in the Barter and Exchange Department nor cash deals of any other kind. Almost anything goes but this—within limits.

One member of the Club wrote in to tell us that he had contacted 14 other members and had made some very satisfactory trades. This is what we like to hear. He not only traded photos but also books and magazines. So far as I can see, books and magazines are as much a factor in the Phans Club as photographs.

As remarked last month, photos of modern ships are now creating more interest than the World War planes that were so popular up to the last three months. Wonder why this is? Maybe model building has something to do with it or else everyone has more or less completed a World War collection.

After four months, we are reluctantly compelled to withdraw our offer of $1.50 for each satisfactory photo submitted to us. At one time we thought that this would be an excellent plan, but there was so much grief connected with it and so little return in the way of usable photos that we must withdraw our offer. Out of some 500 photos and pictures received we were only able to use 17 of them. The remainder were rejected for many reasons. They were too feeble or indistinct, they were photos which we had already run, or they were not real photos but simply magazine clippings, or some other reason.

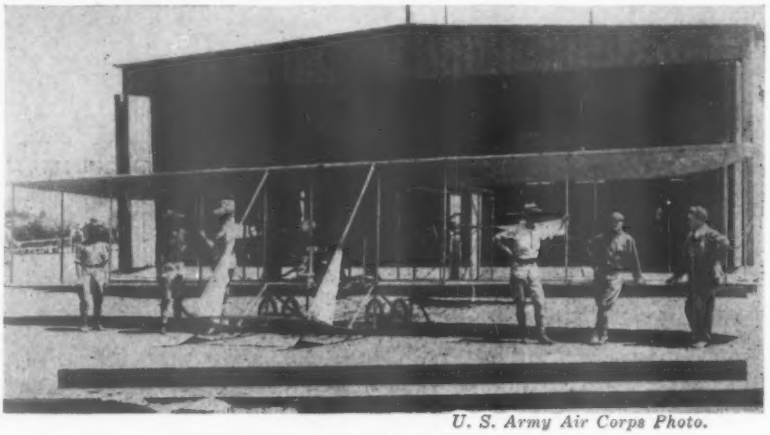
And, again, came the ordeal of returning the photos. Some, after our repeated cautions on the subject, had no name or address. Other photos came back to us with the rubber stamped remark by the Postoffice, "Moved and left no address", and a hundred other hair-raising difficulties were encountered.

Hope you all like our inside front cover picture this month. We got this series up specially for the membership of the Photo Phans club. We have had so many requests for full page size pictures that we determined to give you something that would be well worth while. We will be glad to hear from you on this subject, your approval, disapproval or suggestions.

Each of the full page war pictures will represent some actual incident that took place during the World War, and they will therefore have a historical value as well as being ornamental. The picture in the present issue depicts the death of Richthofen.

He Was the Dressmaker to the First Army Plane

By COLIN CAMERON



U. S. Army Air Corps Photo.

The U. S. Army Signal Corps Plane, a Wright "B".

DURING the year 1910, an appropriation of three hundred dollars was authorized for experiments by the Aviation Section of the Signal Corps.

A large portion of this amount was expended in tailoring work performed by one William Meyer, a German tailor who operated a small shop in San Antonio. Meyer's job was to cut, sew and attach the wing fabric to the old Wright biplane, the first plane to be flown by the Army and in which one nervy Signal Corps second lieutenant, Benjamin D. Foulois, cracked up every day or so.

William Meyer has a shop in which the sewing machine used by him in those days, is still in daily active service. Meyer tells of the day when the "crazy Frenchman", as he termed the aviator, first came to his shop and asked him to undertake the work. He was asked to come to the "hangar" where the work was to be done. "Hangar?" asked Meyer, "What's that?" "An old stable where we keep the airplane," answered the officer.

Today, the officer is Major-General B. D. Foulois, Chief of the Air Corps. In the photograph he appears, second from the right, leaning on the wing of the plane upon which the Government gambled three hundred dollars—and won. The remaining persons are, left to right; Vernon Burge, now an Air Corps captain; Private Kenneth Kingle, Signal Corps; Sergeant Herbert Marcus, now retired from the Army; Sergeant Stephen J. Idzorek, now a captain, Air Corps.

Launching by Means of a Motorcycle

ALL sorts of launching schemes have been tried in Europe and America, ranging from rubber shock-cords to towing by tin-lizzies and Rolls-Royce cars. They slide them downhill on chutes and they snap them into the air by catapults.

The accompanying picture shows that Germany is starting to try out means other than the shock-cord, and has impressed a motorcycle into the labor of launching. Seems though, that the tow rope is a great deal too short for this stunt to be successful.

Here they are all ready for the launching via the motorcycle system.

The Monument at Kitty Hawk

The great monument erected by the Government in memory of the first flight by the Wright Brothers. This story is an abstract of an article appearing in the U. S. Air Corps News Letter.

IN A story on "The Early History of the Airplane," written by the two famous aviation pioneers, Wilbur and Orville Wright, they tell us that the first flights with the power machine were made on December 17, 1903. "Only five persons besides ourselves were present. These were Messrs. John T. Daniels, W. S. Dough, and A. D. Etheridge, of the Kill Devil Life-Saving Station; Mr. W. C. Brinkley, of Manteo and Mr. John Ward, of Naghead.

"Although a general invitation had been extended to the people living within five or six miles, not many were willing to face the rigors of a cold December wind in order to see, as they no doubt thought, another flying machine not fly.

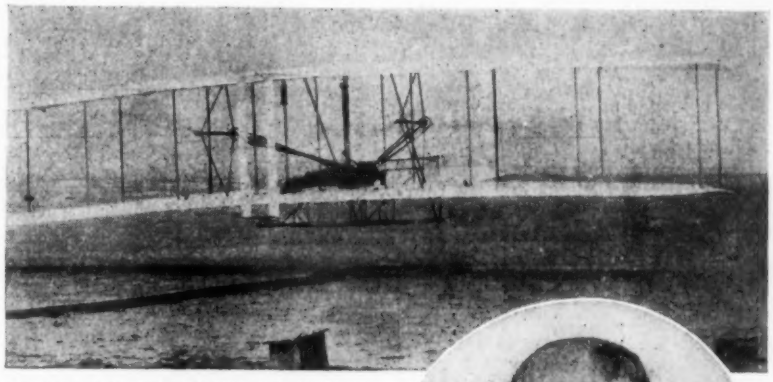
"The first flight lasted only 12 seconds, a flight very modest compared with that of birds, but it was, nevertheless, the first in the history of the world in which a machine carrying a man had raised itself by its own power into the air in free flight, had sailed forward on a level course without reduction of speed, and had finally landed without being wrecked.

"The second and third flights were a little longer, and the fourth lasted 59 seconds, covering a distance of 852 feet over the ground against a 20-mile wind."

Now, 29 years later, on the spot where the Wright Brothers made their first successful flight, stands a 60-foot granite pylon, erected on the summit of Kill Devil Hill at Kitty Hawk, N. C., to mark the birthplace of modern aviation. This monument was dedicated on Saturday afternoon, November 19th, to the genius and courage of these two young Dayton bicycle mechanics who conquered the air. Wilbur Wright is dead, but Orville, who soared aloft for the first time in history in a power plane, attended the ceremonies.

Led by Secretary of War Hurley and Secretary Adams of the Navy, a large crowd of famous flyers and flying enthusiasts attended the dedication of the Wright Beacon. The monument is a magnificent triangular granite shaft surmounted by an airways beacon. Flood lights will illuminate the monument at night, making it a distinctive feature of the landscape. It will serve as an aid both to aerial and marine navigation.

The memorial was erected by authority of an Act of Congress by the United States Government at a cost of approximately $250,000 to commemorate the marvelous achievement of the Wright Brothers at this location. The monument was constructed by the Quartermaster Corps of the United States Army, under the general supervision of a commission composed of the Secretary of War, the Secretary of the Navy and the Secretary of Commerce.



The first power flight at Kitty Hawk, N. C., made by Orville Wright, Dec. 17, 1903.

At the instance of the Kill Devil Hill Memorial Association, the Senators and Representatives of North Carolina secured the passage of a bill by Congress authorizing the acquisition of a site and the erection of a monument commemorating the first heavier-than-air flight. This bill was approved by President Coolidge on March 2, 1927. Kill Devil Hill has an elevation of 91 feet above sealevel.

On account of prevailing winds, the sand on this hill was shifting constantly and one of the first tasks of the construction engineers of the Quartermaster Corps was to anchor this sand.

The Kitty Hawk Monument, erected at a cost of $250,000 by the Government in commemoration of the Wright Brothers' achievement.

A late picture of Orville Wright taken at the Dayton, Ohio, memorial exercises.

This was done by clothing the wind-swept dune with a type of grass which tied it to the beacon. This was a remarkable achievement. Many engineers expressed the opinion that it could not be done, and recommended a change of site.

The design of the monument was selected after a nation-wide competition of artists and architects. The monument is made of Mount Airy granite. On December 17, 1928, the 25th anniversary of the first flight, the corner stone of the monument was laid by the Secretary of War, Dwight F. Davis, in the presence of a large gathering of persons from all sections of the country. Actual construction work on the monument, however, did not begin until February, 1931. The delay was necessary in order to permit the growth of the grass to anchor the sand dune.

The site of the new monument is in a region rich in historic interest. Not only is it the birthplace of modern aviation, but it is within a few miles of the birthplace of Virginia Dare, the first white child born in the territory embraced within the United States. It will be recalled that the first English Colony in North America was established on August 17, 1585, by Sir Walter Raleigh on Roanoke Island, the

outlines of which are plainly visible from the Wright monument.

Arrangements had been made to handle 20,000 persons, but heavy rains throughout the night and most of the morning cut the attendance to a bare thousand, and hundreds of these sat in automobiles far from the speakers' stand as the storm raged.

The Hon. Patrick J. Hurley, Secretary of War, paid tribute to the genius of the Wright Brothers, classing them as among "America's immortal sons," in the principal address of the occasion. Extracts from his address are quoted below, as follows:

"We have come here to dedicate a monument to the genius and the courage of the two great American pioneers, Wilbur and Orville Wright. While Orville Wright was to have the honor of piloting the plane in the first actual flight, the achievement was the joint accomplishment of both brothers. After years of intelligent and persevering experiment, they succeeded, for the first time in human history, in achieving a successful power-driven flight. As a direct result of their successful flight right here at Kill Devil Hill on December 17, 1903, the conquest of the air is to be achieved. I use the future tense advisedly. Great as has been the progress since these intrepid men achieved the first successful flight in a power-driven plane, air transportation is yet in its infancy.

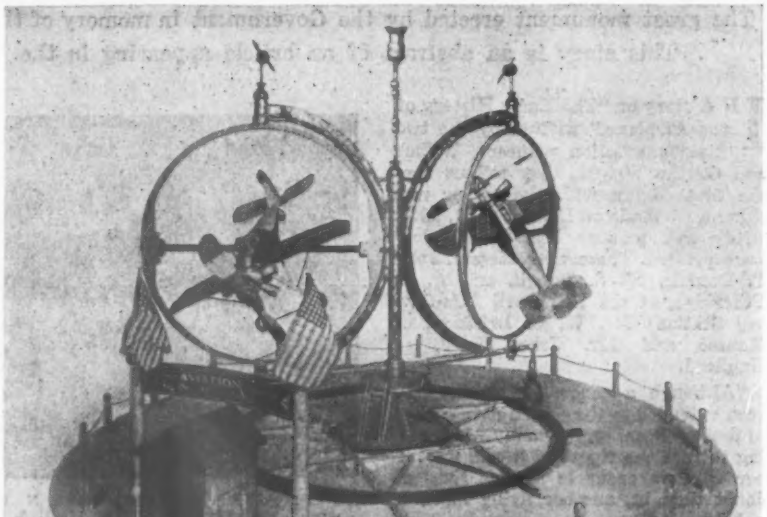
"By this eloquent monument, America pays a profound tribute to two of her immortal sons. Little that we may say here today will add to the lustre of their renown or to the glory of their achievements. Far more eloquent than words, the mighty aircraft that fly above us day and night proclaim their handiwork. In honoring these two pathfinders, we should recognize in their achievement the spirit of America that made their inventions possible. We should dedicate ourselves to the perpetuation of the ideals of American life that encourage such individual enterprise. In world history our nation is very young, but many of civilization's most significant victories over the elements of time and space first were realized in this country.

"In the dauntless courage of the Wright Brothers, who despite all perils, criticism and ridicule, persisted in their faith, and lived to realize their dreams, we see a manifestation of that same pioneer spirit that explored a continent, colonized a new world and developed American civilization. These very shores of North Carolina which witnessed the successful conquest of the air by Wilbur and Orville Wright have beheld many other striking examples of this great pioneer spirit.

"Close to this very sand spit, where now stands the monumental shaft to honor the Wright Brothers, landed Sir Walter Raleigh's band of fearless colonists. They came not as adventurers in a quest of gold and glory but

(*Concluded on page* 133)

P. A. Provides Inspiration For Trainer



Here is a Stein Duplex ground trainer arranged as a concession in an amusement park. The model, from which this photograph was made, is so beautifully constructed that it should have been entered in our model contest.

THE article "Flying With One Foot on the Ground", appearing in the November issue of POPULAR AVIATION, has sure started something in ground training circles. Mr. Fred Annes lit the fuse that set off the bomb that got our inventors all thinking.

And, just as we are going to press, appears Mr. George Stein, an inventor of Hobart, Ind., who presented us with the accompanying photographs and a description of his beautifully constructed trainer model. This trainer has been worked out in great detail, in model form, and will be of interest to all beginner pilots, schools and amusement parks.

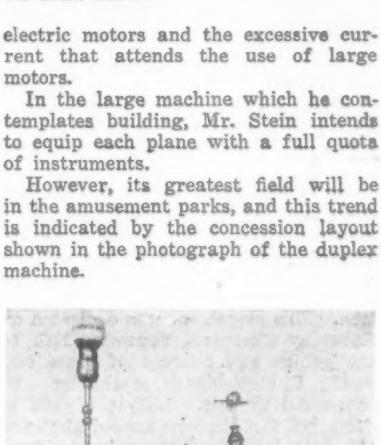
As will be seen from the photos, Mr. Stein contemplates building two different types of trainers, one with a single plane and the other with a two-seat or duplex arrangement. The detailed construction of the units in each type, however, is the same.

By means of the mechanism shown, the model ship can turn in three planes, and at the same time can fly around the central post or axis, the latter being the equivalent of forward or translational motion which is lacking in the majority of ground trainers. Of course, the circle in which it travels is quite small, but there seems to be no reason why the circular path cannot be made proportionately larger than with the model.

Mr. Stein claims a great saving in power by this arrangement and predicts that a tremendous speed can be developed with only a few horse power instead of requiring the large electric motors and the excessive current that attends the use of large motors.

In the large machine which he contemplates building, Mr. Stein intends to equip each plane with a full quota of instruments.

However, its greatest field will be in the amusement parks, and this trend is indicated by the concession layout shown in the photograph of the duplex machine.



This is the single trainer that revolves around the central column.

A Simplified Design Chart

A graphic chart designed by one of our readers (who forgot to sign his name). This chart shows the air-speed, wing loading and power loading simultaneously, an arrangement that is very convenient for the designer and estimator.

IN THE October issue of POPULAR AVIATION, there appeared two interesting loading and speed charts, the values for which were derived from present day practice rather than from rational formulae. They were laid out with the purpose of making preliminary estimates upon the various performance characteristics and dimensions of airplanes.

In studying these charts over, I came to the conclusion that all of this information could be combined in a single chart, and further, that this arrangement made it possible to show even more data than possible with the original charts. Therefore, I finally deduced the accompanying chart which I believe will prove useful in making preliminary design estimates.

The data from which this chart was designed is also taken from practice and applies to airplanes of conventional design fitted with one engine only. Therefore, the values of the high speed checks closely with the values of the charts in the previous issue.

As will be seen on a close examination of the chart, independent scales are marked on three sides—at the left, at the right and at the bottom. The vertical scale at the left shows the wing loading in pounds per square foot. The vertical scale at the right gives the landing speeds in miles per hour, while the scale along the bottom horizontal lines gives the so-called "power-loading" in pounds carried per horsepower.

Now, the radial lines emanating from the lower left hand corner of the chart are functions of the top speed in miles per hour, and the speed represented by each of these radial lines is marked on the lines in the small rectangles. Any speed other than those indicated by the angular spacing of the radial lines can be determined by working out a pro-rata estimate of the distance between the lines.

To use the chart, we can start with any one of the four given quantities, the landing speed, the top speed, the wing loading or the power loading. Thus, as indicated by the dotted line drawn on the chart, we have four quantities determined as follows, assigning them numerical values for this particular case.

Wing loading.....15 lbs. per sq. ft.
Power loading.....13 lbs. per h. p.
High (Top) Speed.....144 m. p. h.
Landing Speed.....66.5 m. p. h.

By tracing these dotted lines back and forth you can easily see how to work the chart for any combination of the four values that might be required. It is noted that these figures simply represent the average values encountered in standard practice, and that they do not take any particular wing section into account. However, they give a fairly close estimate of the properties of a standard type plane.

In making up this chart, the high speed is taken as being a function of the power and the total loading, while the landing speed is a function of the wing loading only. In other words, the heavier the wing loading and the greater the horsepower, the higher will be the speed—which is natural.

The heavier the wing loading, the higher will be the landing speed which represents conditions as in practice.

* * *

EXAMPLE 1. If the wing loading is 15 pounds per square foot, find the landing speed.

SOLUTION. Find the given wing loading (15) on the left vertical scale and follow horizontally across to the right hand scale where a landing speed of 66.5 m. p. h. will be indicated.

* * *

EXAMPLE 2. Find the power loading in pounds per horsepower with a speed of 144 miles per hour, wing loading being 15 pounds per square foot.

SOLUTION. Find wing loading on left scale (15) and follow to right until a radial line corresponding to 144 m. p. h. is found. In this case, the value of 144 m. p. h. will be estimated as this radial line is not actually drawn. Next, when the horizontal trace strikes this radial speed position, trace down vertically to the lower horizontal scale where it will be found that 13 pounds per horsepower will be the loading.

* * *

EXAMPLE 3. To find wing loading corresponding to a landing speed of 66.5 m. p. h.

Solution. Reverse the method of (1), that is trace from the landing

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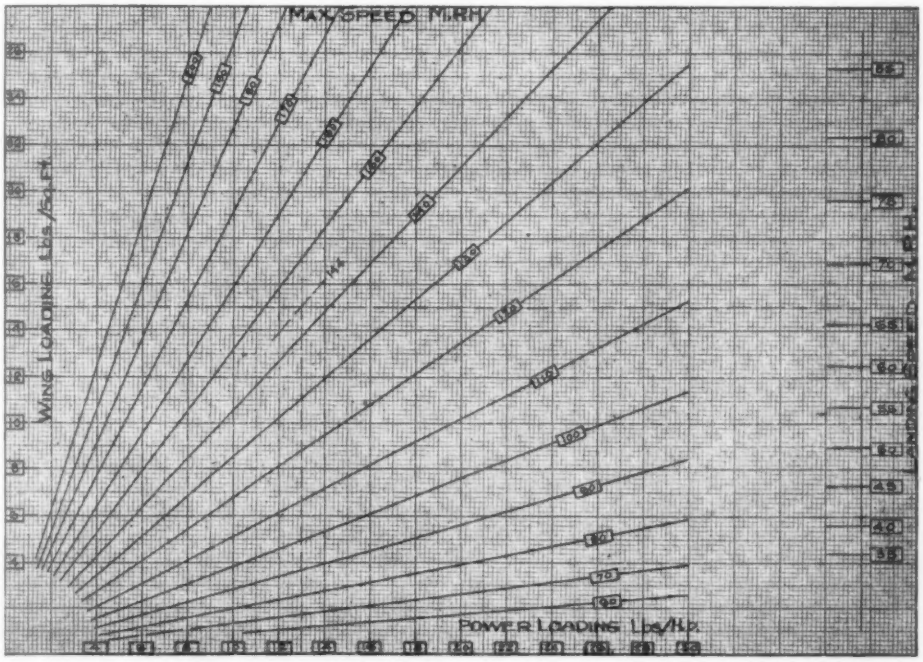


The speed-loading chart by which power loadings corresponding to top speeds, and wing loadings corresponding to landing speeds can be quickly determined.

Looping a Glider

EVERY fine Sunday, a quiet, unassuming young man has climbed into his streamlined glider at Akron's Municipal Airport and after being towed along behind a plane for awhile, has taken off in a surprising number of loops.

He has, in fact, long since broken not only the world's glider looping record, but has continued to break his own record on each successive Sunday.

The young man's name is E. J. or "Bud" Sutherland. He learned to glide three years ago when he joined the newly-formed glider club of the B. F. Goodrich Company where he is employed in the experimental department. He is 31 years old and has a wife and two youngsters.

His record number of consecutive loops so far is 34. The previous world's record was 18. He believes, that with correct winds and weather conditions, he can make as many as 70 loops in his glider.

In order to know how many loops he has made without depending on spectators to tell him, he has installed a

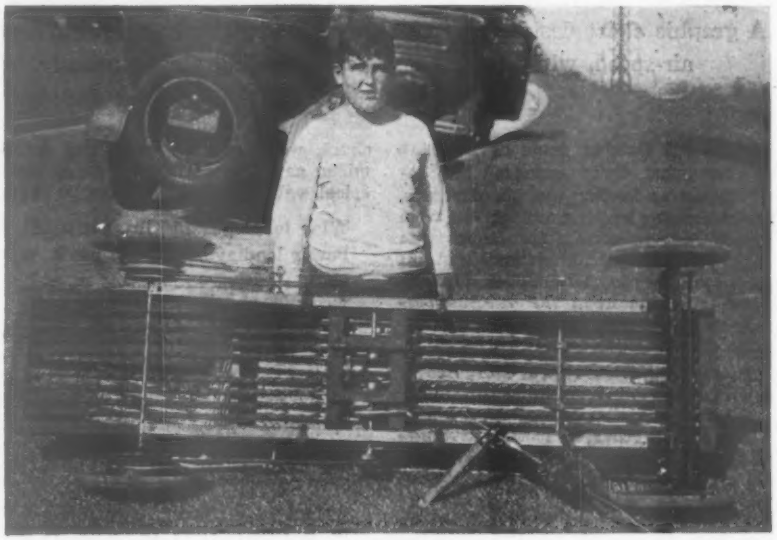
"Bud" Sutherland who specializes in looping gliders.

counter in the little craft. The glider is also equipped with a conventional turn and bank indicator and an accelerometer to indicate the strain on the glider.

In order to make the 70 loops he is planning on, Bud will have to soar to an altitude of 5,000 feet. As close as he could figure it, on recent looping trips, he has lost about 77 feet per loop.

"No, I don't get dizzy not the least bit," he said. "I fact, the most unusual sensation comes during the dive into the first loop. After that the loops smooth out into complete circles and the sensation of rushing groundward is entirely missing. I keep my eye on the ground to be sure I am making the loops in the same direction. My altimeter tells me when to stop. This I do between 1,000 and 800 feet."

A Rubber Propelled Automobile



View of the underside of the car showing the 16 rubber motors and the gearing that connects them with the driving wheels of the automobile.

PERHAPS this is not strictly an aviation story, but it is so closely related to model power plant building that we believe that model builders will be much interested in the giant rubber motor employed on this auto.

Recently, many Los Angeles motorists have been surprised to encounter a midget automobile gliding serenely along its well-paved boulevards. It starts, stops, free-wheels and reverses. Yet casual inspection beneath its hood reveals no engine; no electric motor nor storage batteries. The mystery of its source of power is revealed by a look underneath the chassis—the twisted rubber band motor.

Nearly everyone is more or less familiar with the potential power which can be stored up in twisted rubber bands. This power is almost universally applied for propelling model airplanes, but its application to an auto vehicle rests with a Los Angeles inventor.

At first thought, one might think that sufficient power could not be stored up in rubber band motors to be available for heavy work. But anyone who has felt the "pull" on the prop of a fully wound up model airplane knows that the twisting torque is appreciable. If this torque were multiplied by, say sixteen, it would be considerable. The baby auto is "motored" with sixteen very large rubber band motors.

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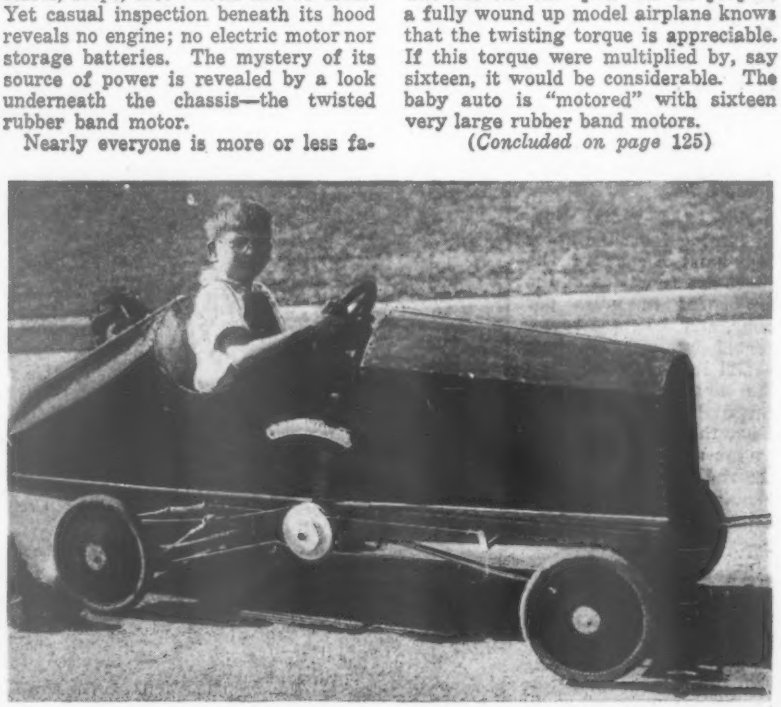


The car ready to run. Note the control lever and the drive pulley (white circle) that is belted to the rear wheels.

Hints on Landing a Lightplane

by MANLEY MILLS

Practical hints on landing a lightplane that will prove of particular value to homebuilders. As the author points out, there is a considerable difference between the handling of a large ship and the small low powered plane.

USUALLY, it is the landing of a ship that gives the beginner the most trouble. And a bad landing may lead to a lot of trouble including hospital bills, repairs, etc.

For the above reasons, the following pointers on landing your plane are given. Special attention is given to certain peculiarities of the lightplane, calling for a few precautions not necessary in the case of a large ship.

First of all, a small plane usually has a light wing-loading, causing a floating tendency when landing which is quite disturbing at times. Somehow, you're not sure when the plane is really on the ground for keeps. It just skims lightly along with the wheels barely touching until it decides to settle down.

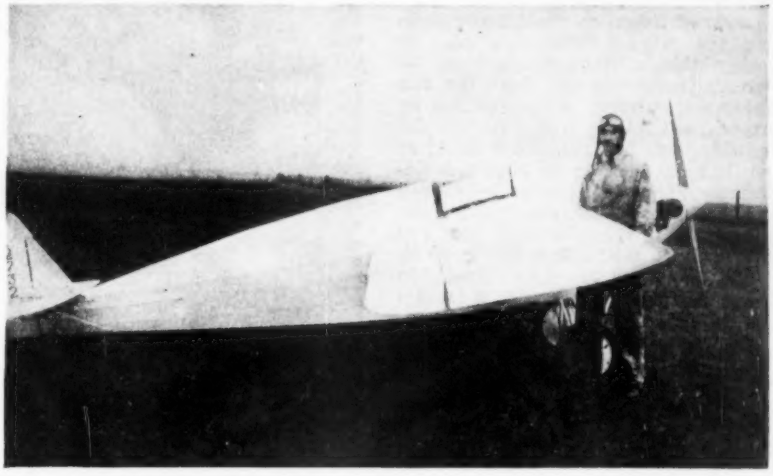
One good feature, however, is that when it does settle down it doesn't roll but a few feet. But that's not what we're concerned about. Just bear its light loading in mind and don't try to set it down in the same way that you'd land a heavy plane.

The parasol type of plane leaves hardly anything to be desired in the way of visibility. In fact, the downward vision is so good that it really has a disadvantageous feature. That is, the wheels are in plain view. And it seems that the amateur flyer just can't resist the temptation to look at the wheels when he is landing. To look directly under the plane is disastrous.

The apparently swift motion of the ground under the plane will upset his sense of balance as sure as thunder. You can't judge your height by looking straight down. Look about fifty yards ahead when landing. The ground isn't moving so fast out there, or at least doesn't seem to be.

Another thing that's likely to upset your judgment a little in landing is that your seat in the lightplane is usually nearer the ground than in the large training plane. However, this isn't so very important but is worth mentioning, nevertheless. As a rule, the nearer the pilot is to the ground, when seated in the plane, the easier it is for him to land.

When landing in a strong wind you'll probably find that you have an instinctive tendency to push the stick forward before the wheels make contact, causing a tail-up landing. The tendency is no doubt due to the fact that the plane is moving at a comparatively slow speed relative to the ground, though the air-speed is normal, creating the illusion that the ship is near the stalling point. Consequently, you instinctively try to avoid the purely imagined stall.



A Church "Midwing" plane equipped with a Long Harlequin engine, a combination that has given excellent performance when flown by amateurs.

One of the common faults of beginners is leveling off too much, that is, pulling the stick so far back that the ship starts ascending again. This condition is aggravated in the case of the lightplane because of its light wing-loading and sensitiveness of controls. When you over-control in this respect, you must act quickly or a stall is likely to occur. Push the stick quickly forward as the ship's nose goes up, pulling it back with equal alertness, though not too sharply, as soon as the upward movement is stopped.

A good point to remember in landing is to assume that you are going to let the ship land, rather than *make* it land.

It is better to level off too high than too low, though the former is not exactly desirable. When a bad bounce occurs, especially if it results from failure to level off, open the throttle and try again. As the ship travels upward on the bounce, push the stick forward, pulling it back quickly as the machine settles.

There is one kind of landing that we don't like to think about, and that is a forced landing, something that is bound to happen sooner or later if you do much flying. As some wisecracker once said, "If your engine stops, come down at once". And that is where the trouble lies. Among other things, the ground under you at the time often happens to be in no fit condition for a safe and comfortable landing.

When the engine does not stop completely, you can use the small amount of power available to stretch your glide. It is when the engine quits cold, especially just after taking off, that you may have to do a little quick brain work to save yourself.

When the engine stops just after the wheels leave the ground, say three or four feet up, there is no choice but to hold the elevators in a neutral position and let the ship sink to the ground, trusting to luck that it won't overrun the smooth portion of the field. Even at its best, this sort of forced landing will never remind you of the alighting of thistledown. You may consider yourself lucky if you get by with only a few bounces and jolts.

Engines also have an old custom of stopping just when the plane is well off the ground and starting to climb, 25 feet up, we'll say. With engine failure under this condition comes a severe test of the pilot's judgment.

Nine times out of ten, the amateur will try to nose down into a glide. As soon as the power and slipstream effect disappears, the ship rapidly approaches the stalling speed, and the elevators begin to lose their highly important effectiveness.

Due to the plane's sluggishness in answering the elevator control, the nose will not begin to go down until the plane is almost on the ground. There is no chance of leveling off. The ship usually strikes on its nose.

It is better to try to keep the ship level from the instant the motor stops, pulling the stick back as it nears the ground. If this is done, the ship is less likely to dive into the ground.

If the engine stops when you have considerable altitude, 500 feet or more, but are not yet out of gliding range of the field, you have the choice of

continuing straight ahead or turning back. Even though there seems to be no suitable landing place ahead, sometimes it is better to keep going straight than to attempt the turn. However, if you choose the latter course, always dive to gain speed *before* making the turn, instead of starting the turn and trying to gain speed at the same time. When gliding down to a forced landing from a considerable altitude, always try to approach the field with a good margin of height to avoid undershooting the selected landing place. In losing this altitude preparatory to setting the ship down, don't try any fancy maneuvering unless you are an experienced pilot. No one will be watching you perhaps, and it would be no time for showing off anyway. Remember, you have no motor to pull you out, and sideslipping, etc., will kill the plane's flying speed so quick that you are likely to stall before you know it.

It is important to see that your ship is not drifting sideways when it touches the ground.

Sometimes, a cross-wind landing is unavoidable. The field may be narrow with the wind blowing across it. If the wind is strong and it seems likely that the landing gear will collapse unless the drifting is stopped, drop the wing on the windward side, landing on one wheel. The tendency of the plane to sideslip into the wind as a result of this maneuver will counteract the drift.

When the landing space is very restricted it is possible to make a very short run by kicking the rudder over close to the ground, causing the plane to skid, recovering just before the wheels touch.

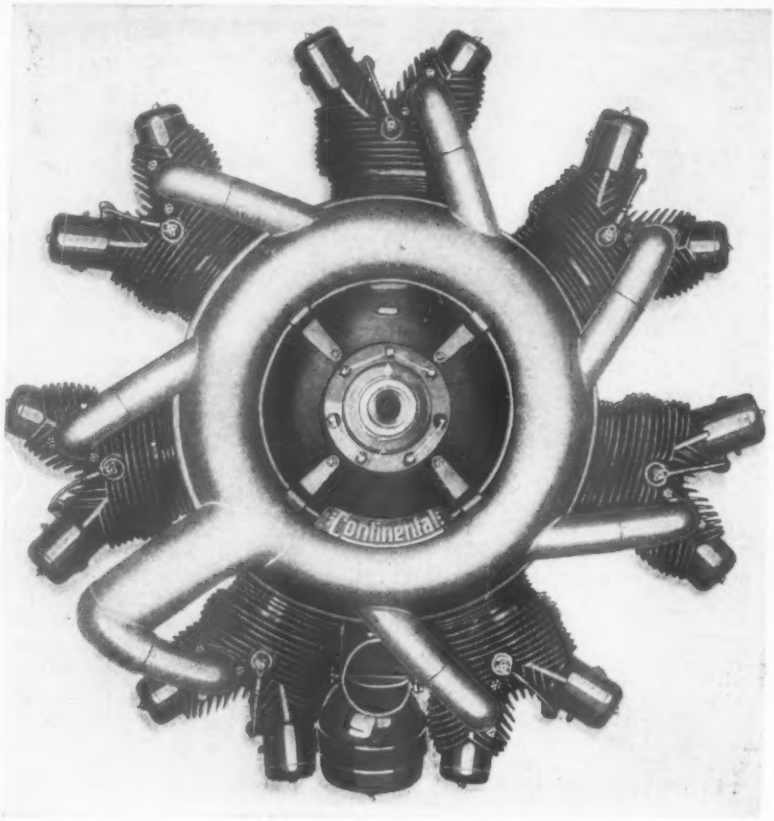
Rather than run into rough ground, or crash into an object, it is better to kick the rudder hard over and take the chances of a ground-loop.

Don't make any unnecessary movements of the controls if you have to carry the glide as far as possible in order to reach the selected landing spot. The slightest unnecessary movement causes the loss of precious altitude which can't be regained.

Sometimes, a landing must be made where there is no place to land in the usual manner. If a crash landing is unavoidable, keep your flying speed until the last moment, then pull the stick hard back, as far as it will go. A head-on crash almost always injures the pilot. As long as you don't hit nose first, your chances of injury are lessened. It is surprising how great a shock the wings of the plane will absorb. That is why a pilot usually escapes injury when he crashes between two trees or two other objects.

When you see that it is impossible to avoid wrecking the plane, don't risk your life by trying to bring it down without damage. Don't try to save the plane, but crash it so as to take full advantage of its capacity as a shock-absorber. Many a pilot has escaped serious injury even though his plane is completely wrecked, simply by keeping cool and not losing his head.

The Continental R-670 Radial Engine



Front elevation of the Continental R-670 radial air-cooled engine, showing the distributer ring and the arrangement of the valve system.

THE Continental R-670 radial air-cooled engine is the outgrowth of the Continental A70. The newer R-670 has an A. T. C. official rating of 215 h. p. and is simply an enlarged version of the A70, the bore being increased from 4⅝ inches to 5⅛ inches in the R-670 engine, this change raising the piston displacement from 544 cubic inches to 668 cubic inches.

The additional 45 h. p. thus gained is attended by an increase in weight of only 25 pounds, the total dry weight of the R-670 being 425 pounds with a specific weight of 1.98 pounds per horsepower.

While this material increase in output has been attained, the overall and installation dimensions remain the same as before so the latter engine can be used to replace the A70 without change in the mounting.

Accompanying the increased bore are a number of changes in the design of the cylinders, the cooling fins on the head being rearranged to accommodate the additional heat while the head has been laid out to reduce the tendency toward detonation. The pistons have also been changed to a permanent molded casting.

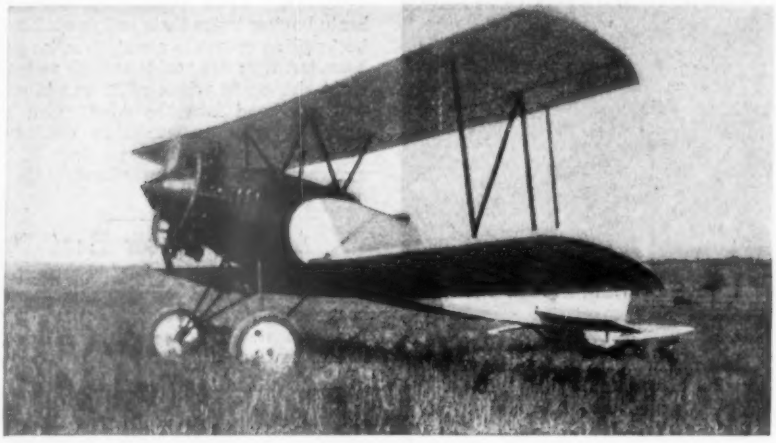
In addition to the enlargement of the cylinder openings in the crankcase, to accommodate the larger bore, the cross-sectional area of the suction manifold has been increased and the abrupt changes in section have been relieved. Other changes are minor ones such as a deeper oil sump and moving the breather tube.

Side elevation of the Continental R-670.

What Our Readers Are Building

A department devoted to our readers' activities in airplane, glider and engine construction, showing the latest developments.

And Here Is an Indiana Biplane



This biplane, while a little above the lightplane class, because of its 120 h. p. engine, is home-built and that is sufficient to entitle it to admission in these columns.

MOST of our reader's lightplanes, to date, have been of the monoplane variety, but here we have a mighty fine little biplane, designed and built by Fred J. Lisch, Clinton, Ind., who can be reached through Mr. Homer L. Mitchell of that city.

Mr. Lisch is justly proud of the little plane for he says that it was a complete success from the first day it was flown. It hardly comes under the lightplane classification, for it is equipped with a 120 h. p. engine, but it is home-made and that is sufficient for it to be described in these columns.

It is a two-place job with dual controls, the seats being arranged side-by-side, and when fully loaded, it has a speed of approximately 125 m. p. h. It has climbed to 3,000 feet in less than four minutes.

It took nearly two years to build the plane in spare time, and it has now been flying for more than 18 months. The total air-time is not known as it was sold to another man about one year ago, but the buyer was well pleased with it as it proved to be the fastest ship at his airport in spite of the fact that it competed against three commercial ships at this port equipped with 180 h. p. engines. It has been tested for dives and spins by several good pilots, including one National Guard pilot and one army man. The following specifications will be of interest.

Specifications of Lisch Biplane

Span, upper wing	27'-6"
Span, lower wing	26'-0"
Dihedral, top wing	4 deg.
Wing Chord	4'-0"
Airfoil section	Clark "Y"
Length overall	20'-0"
Weight, empty	1115 lbs.
Weight, loaded	1480 lbs.
Speed, maximum	125 m. p. h.
Speed, cruising	105 m. p. h.
Speed, landing	45 m. p. h.
Climb	800 ft./min.
Maximum altitude attained	16,000 ft.

This is very fine, and should be called to the attention of some of our legislators who believe that amateur built ships should be put out of the running.

Would You Come to Chicago?

AS READERS of this department know, a Lightplane Association of America is on the verge of being formed. It has been suggested that POPULAR AVIATION sponsor a convention for lightplane owners and fans to be held in Chicago during the World's Fair.

At such a convention, complete plans could be worked out for the Lightplane Association of America, officers elected, by-laws adopted, and legal procedure planned to combat adverse state legislation which hinder lightplane flying.

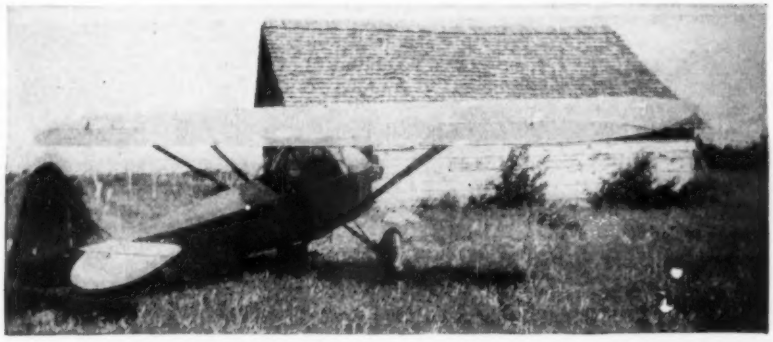
After the convention, a formal series of races, exhibitions and contests could be held, perhaps in collaboration with the World's Fair committee, confined to lightplanes of 50 h. p. or less.

If P. A. decided to sponsor a convention and program of this nature, how many readers would attend, and how many lightplanes be entered? Here's your chance, brother howlers, write us and let us know whether you would come.

Long Distance Radio

AN UNUSUAL instance of long distance reception of airplane radio conversation is reported by Frank Dorbrandt, who states he heard a pilot near Sacramento calling the Sacramento ground station for a weather report, although Dorbrandt was at Point Barrow, north of the Arctic Circle. The distance is 2,400 miles.

This Heath Was Built From P. A. Plans

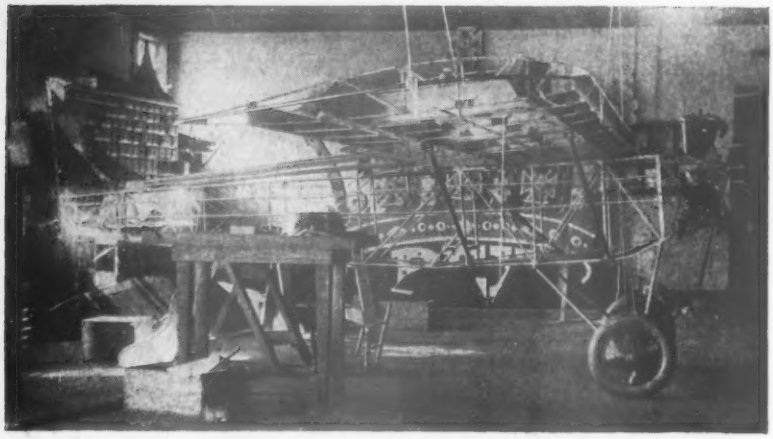


This fine Heath-Henderson was constructed by Harlan H. Patton, Clinton, Ark. It is all ready to test hop.

BUILT entirely of raw materials, and using the drawings published in POPULAR AVIATION, Harlan H. Patton, Clinton, Ark., has completed a very creditable job on his Heath. He expects to test-hop it in a very short time.

This little ship is equipped with a Heath-Henderson engine. He promises to send us photographs of the ship after she is test-hopped.

Another Lightplane From Oregon



Here we have the assembled structure of the Yale E. Smith monoplane, an original design.

THE State of Oregon seems to be mighty active in aeronautics, for we have received many entries from this state. And now comes Yale E. Smith, 948½ Oak St., Eugene, Oregon, with a fine looking job that he is building.

Evidently, this ship is an orginal design by Mr. Smith for its outlines are not familiar to us. The following specifications are quite interesting and deserve close study by our readers.

Specifications of Smith Lightplane

Wing span	29'-8"
Wing chord	4'-6"
Wing area	126 sq. ft.
Airfoil section	M. 6
Dihedral angle	2½ deg.
Length overall	17'-4"
Height	5'-4"
Weight, empty	437 lbs.
Weight, loaded	675 lbs.
Engine (Anzani)	45 h. p.
Load per horsepower	15.0 lbs.
Loading on wings	5.04 lbs.-sq. ft.

Mr. Smith promises to send us a picture of the ship after completion, and tell us how it performed during its test-hop. He says that there are three other lightplanes and one powered glider in his town and we are anxiously waiting to get good pictures of these ships as well.

Baxter Builds A Heath Seaplane

TWO interesting photographs were sent to us by A. O. Este, Sudbury, Ontario, Canada. They show a home-made Heath parasol monoplane built by Mr. S. Baxter of Sudbury. This was made entirely of home materials except for a high lift camshaft and the exhaust stacks which were had from the Heath Airplane Company.

This little ship has been successfully flown from skiis during last winter but has not been tried with the floats.

Mr. Baxter proudly displays his home-built seaplane. Another view of this ship appeared in the last issue, erroneously labeled as the workmanship of A. O. Estes.

"Snipe" Boat Is Announced

KNOCKDOWN materials for the home-construction of the new "Snipe" class sailer have been announced by the Brooks Boat Company Saginaw, Mich. This sailboat, 15 feet 6 inches long, carries 99.6 square feet of sail, and is large enough to make her a real seaworthy, safe, fast sailer, classy in appearance and easy to handle for the amateur.

"Snipes" have repeatedly defeated boats having twice their sail area. Their best sailing breeze is about 15 miles per hour, but they are stable enough to stay right-side-up in winds of 50 m.p.h. and will not head into the wind. Can be provided with an auxiliary outboard motor if desired, and with a four H. P. motor will average approximately eight miles per hour.

A Nifty Snow Boat

RALPH AMENT has constructed this fast but comfortable snow-boat which has proved very successful. Note the streamlining of the cabin—a rather novel feature.

Ament's snow-boat all ready to go.

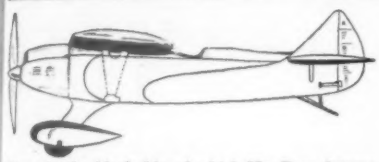
The First Sailplane in Canada

J. L. BARKER, Winnipeg, Canada, writes us a letter as follows:

Believe it or not, this is the first sailplane to be built in Canada, so far as I know. It has a straight wing of 37 feet span and is of original design, all materials being obtained locally. It follows along Bowlus lines.

This is the Barker sailplane, the first in Canada and a nice rig.

Dream Ship Looks Good to Us



Here is the ideal ship of which Mr. Rees dreams. Nice looking job.

HERE we have an entry into the Dream Ship division that looks mighty nice. It is a lightplane dream by Evan J. Rees, Mission, Texas, which gets away from the conventional Gee-Bee designs that have been so common of late.

He is rather doubtful about the advisability of using a cantilever monoplane wing, but this should prove no obstacle in the design of this plane for a number of European lightplanes are so constructed. The strut indicated by the dotted lines can be included but it is not essential.

The landing gear seems to be too far forward and this would place so much weight on the tail skid that take-offs would be difficult.

However, the ship is well thought out and is the type of ship that we would like to see built. It is of a type well adapted for converted motors and could easily be constructed either as a cantilever or strutted wing type.

And so here's the best of luck to you. We trust that you will be able to materialize your dream.

Another Good Looking Dream Ship

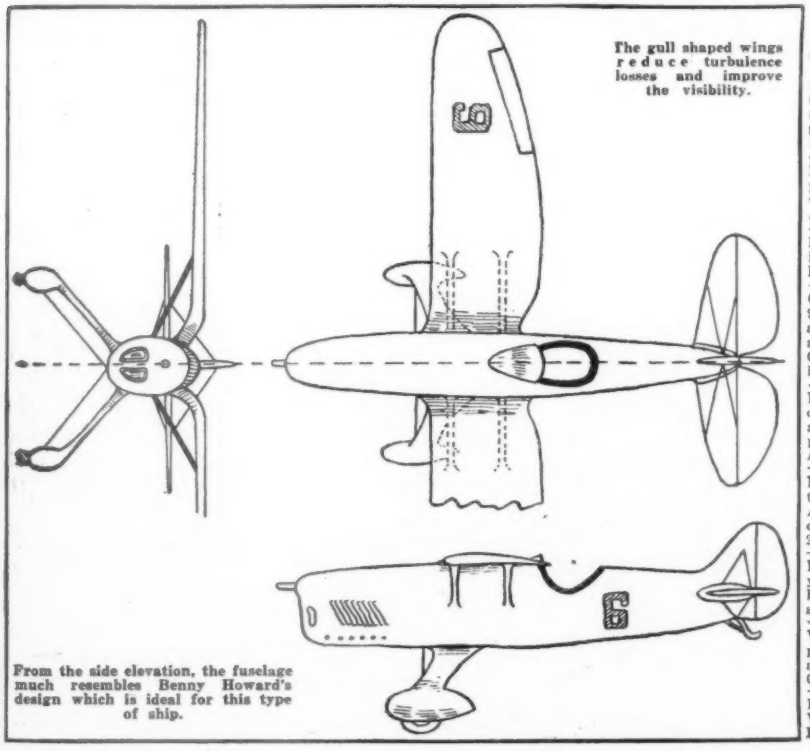
ELMER SCHUTT, 3566 East 49th., St., Cleveland, Ohio, submits a three-view drawing of his ideal lightplane. This is the "Chevolair D-6" which he has evidently named in honor of the General Motors puddle jumper. It is a simple matter to provide the power-plant for this lightplane for, if you are lucky, the engine can be obtained at any Walgreen Drug Store.

This is really a clever little ship that is well worth while studying, for Elmer has incorporated into the design all of the refinements that can be found in the large expensive ships, such as gull wings, full pants on the running gear, inverted engine installation, self- supporting landing gear, etc.

Without criticising the design, we always prefer a wing span of 30 feet and an area of at least 150 square feet, but these limits are not imperative, of course.

Specifications of the Chevolair

Wing span	28'-0"
Chord (tapered), at root	6'-0"
Wing Area	140 sq. ft.
Length	20'-0"
Height	8'-3"
Top speed	150 m. p. h.
Cruising speed	110 m. p. h.
Landing speed	55 m. p. h.



The gull shaped wings reduce turbulence losses and improve the visibility.

From the side elevation, the fuselage much resembles Benny Howard's design which is ideal for this type of ship.

Barter and Exchange

This service is free to readers, but the publishers assume no responsibility for any losses during the trades. You trade "sight unseen."

WHIPPET CABRIOLET, Model 28, convertible top and rumble seat. Is in good condition and looks well. Also have miscellaneous OX-5 parts and seven Miller Overheads all in good condition. Full set of Commandaire flying and landing wires, interplane struts and set of upper wings slightly damaged for the Commandaire.

Will trade the above for a light sportplane having a welded fuselage and in good condition. No stick and wire job considered.—F. C. Plegge, Searcy, Ark.

FORD "T" Airplane engine, less magneto. What have you to offer for this engine in trade?—Don Harenberg, R. F. D. 2, Urbana, Ohio.

HEATH WING, partly finished, with blueprints. Also "Indian Prince", Single 28 Model, completely equipped with 80 m. p. h. speedometer. Will swap for an Indian Scout, either 37 or 45.—Hugh McDaniel, R-1, Itasca, Texas.

PIANO ACCORDION, cost $20. Will trade to anyone in So. Dakota for a used motorcycle in running order. State clearly the condition of machine, year, make, model, etc.—Lester Sandvick, Bristol, So. Dakota.

BALSA WOOD CUTTER, will cut up to 3/8" x 1" strips. Will trade for model parts and plans. Will also exchange cutter for plans or photographs you don't want.—William H. Pennett, Jr., 58 Holden St., Fall River, Mass.

200 MAGAZINES, Air and War story, some with clippings removed. Also two U. S. Army Courts Martial Manuals (1917), one U. S. Army Regulations (1917) and others. What have you?—Charles Braddell, 642 Main St., Paterson, N. J.

FRONTY SPECIAL RACING CAR equipped with lights, starter, wire wheels, Bosch magneto, Zenith carbureter. Will run 80 m. p. h. Will trade for any class of plane.—K. L. Walker, Valley Falls, Kna.

HEATH WINGS (Model V), gas tank installed, ailerons and complete welded tail group. Will trade in as part payment on a used licensed ship.—L. P. (Slim) Kowalke, Wall Lake, Iowa.

LONGSTER WING RIBS (Set of 30), Clark "Y" section, 50 in. chord. What will you trade for these ribs?—Maurice I. Smith, 91 West Grant St., Lebanon, Ore.

POWERED GLIDER, nearly new with Henderson engine. Will trade for an automobile or motor-boat. Will also trade primary training glider for anything I can use.—G. Standly, 4621 13th. Ave., Brooklyn, N. Y.

BICYCLE, BOOKS, airplane models, moving picture projector, etc. Want secondhand typewriter in good condition.—Ralph Najork, Doris Ave., Northport, N. Y.

FLYING SCALE MODEL, 40 in. drawing for 15 in., flying scale model blueprint.—Jerry Sohler, Belden, Neb.

CABIN MONOPLANE, small 3-place with a 90 h. p. radial engine. All new instruments and new wing covering. Will exchange for a good late model car or what have you?— F. C. Wright, E. 69th. Ave., and Avenue X, Brooklyn, N. Y.

PHOTOS Of Akron and Macon showing 200 construction and completed views. The photos are 4" x 4" and 8" x 10". Will swap for other photographs.—William J. Rogers, 1178 Reed Ave., E. Akron, Ohio.

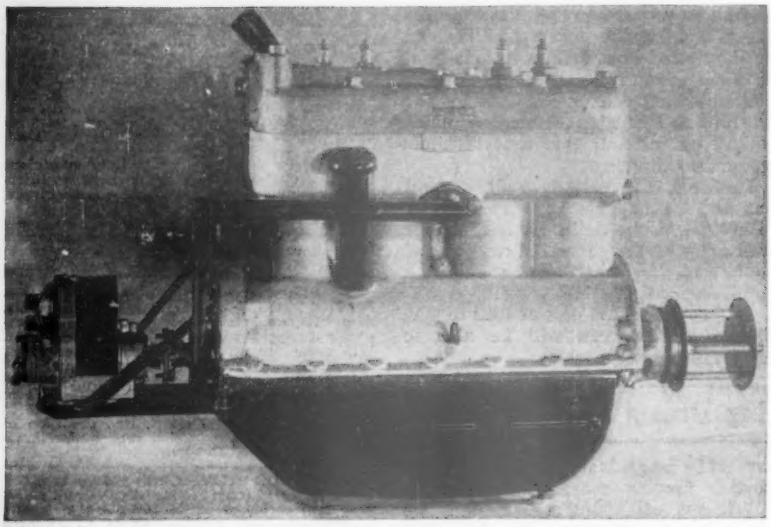
HOME STUDY COURSE complete and complete two years issues of POPULAR AVIATION and Aero Digest. Will trade for a small aircooled engine or what have you?—G. C. Snyder, Box 274, Bassett, Nebr.

FLYING AND GLIDER MANUALS for the years 1929-30-31-32. Am willing to trade. What have you to offer?—Grayson Baker, 413 Harrison St., Lynchburg, Va.

WANTED. Aeronautic data, plane or airport photos, aero books, etc. Send me your lists and what you want in trade.—Box 44, Lachute, Que., Canada.

PHOTOS of Ford trimotor and Spartan biplane. Will trade for other modern photos.—Harry Hoffman, Buckhannon, West Virginia.

How to Convert the



Left side of the completed conversion, showing the magneto mounted on the bracket, the propeller hub and the side mounted water pump connections.

by

B. H. PIETENPOL

Expert on Ford engine conversions for lightplanes.

IN THIS last article of my series on the conversion of a Ford Model "A" engine, we will take up the conversion of the remaining details illustrated by the accompanying drawings. These alterations are not extensive but they should be made carefully and thoroughly.

First, we will take up the matter of the water-pump. I advise the fellow of limited experience to pay a great deal of attention to the pump alterations for a defective pump can cause a great deal of trouble. Make the changes exactly as shown in the plans. First, it will be necessary to cut 1¾ inch in the old pump housing so that the belt will line up and so that you will have room to put on the radiator.

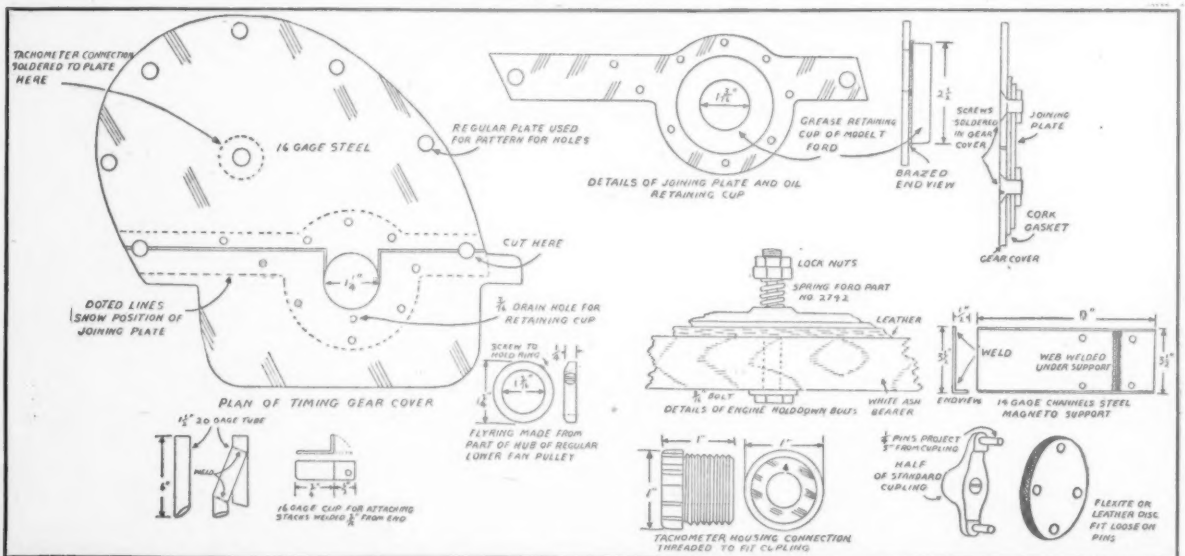
The regular Ford fan pulley is used with the fan blades removed. The pump shaft must also be cut off 1¾ inch, first annealing the shaft before attempting to do this. When this is done, the pump will never fail you and it requires no attention except for a little oiling once every year.

It also has its disadvantage, however. It requires a large radiator hose (1½ inch) and a larger and heavier radiator is also required. Again, when you get the water temperature up to about 200° F., it is likely to throw the water out because of steam locks in the front of the cylinder head.

The side type pump, with the domed cylinder head, does away with all the above troubles but is harder to build. The pictures and the drawing will give you a general idea of this pump, and if you are handy, you should not have any trouble in building it.

The pulley shaft and stuffing box are taken from a regular Model "A" pump, but a new rotor is brazed to the shaft. The lower pump pulley is made from a Model "A" generator pulley. The center is turned out and a piece of steel tubing, 1⅜ inch inside diameter, is brazed in it for a hub. After the pulleys are lined up, drill a ⅜ inch hole in the pulley hub, the crankshaft and the magneto driveshaft. Put in a ⅜ inch aircraft grade bolt, but be sure to put the belt on before the pulley is put into place to stay.

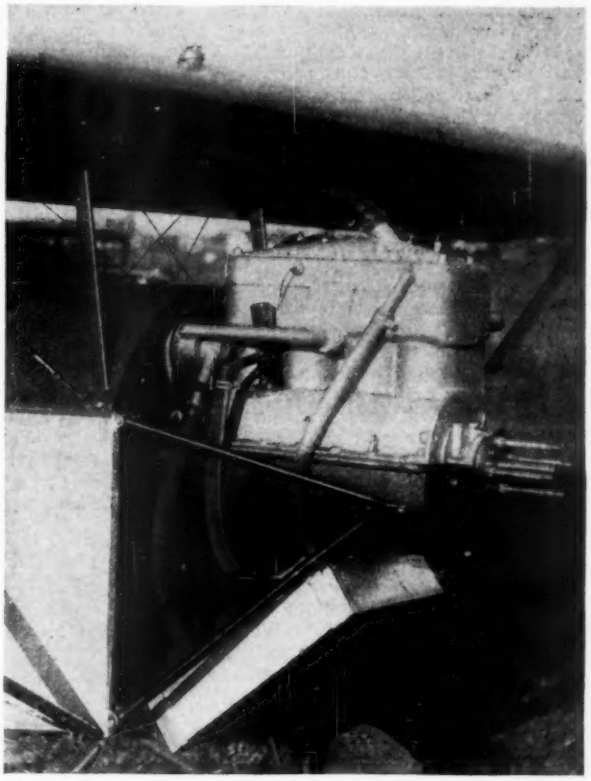
For several years we did all of our flying with the regular cast-iron Ford head—just as it was. The only change that we made was to tap the cylinder head for the temperature gauge. But more recently we tried several types and makes of special heads with the


TACHOMETER CONNECTION SOLDERED TO PLATE HERE
16 GAGE STEEL
REGULAR PLATE USED FOR PATTERN FOR HOLES
CUT HERE
DOTED LINES SHOW POSITION OF JOINING PLATE
⅜ DRAIN HOLE FOR RETAINING CUP
SCREW TO HOLD RING
PLAN OF TIMING GEAR COVER
FLYRING MADE FROM PART OF HUB OF REGULAR LOWER FAN PULLEY
½" 20 GAGE TUBE
WELD
16 GAGE CLIP FOR ATTACHING STAGES WELDED ⅛" FROM END
DETAILS OF JOINING PLATE AND OIL RETAINING CUP
GREASE RETAINING CUP OF MODEL T FORD
BRAZED
END VIEW
SCREWS SOLDERED IN GEAR COVER
JOINING PLATE
CORK GASKET
GEAR COVER
LOCK NUTS
SPRING FORD PART NO. 2792
LEATHER
⅜ BOLT
DETAILS OF ENGINE HOLDDOWN BOLTS
WHITE ASH BEARER
WELD
WEB WELDED UNDER SUPPORT
END VIEW
14 GAGE CHANNELS STEEL MAGNETO SUPPORT
TACHOMETER HOUSING CONNECTION THREADED TO FIT COUPLING
⅛ PINS PROJECT ⅝" FROM COUPLING
HALF OF STANDARD COUPLING
FLEXITE OR LEATHER DISC FIT LOOSE ON PINS

Miscellaneous details necessary for the conversion, including the timing gear cover, oil retaining ring, couplings, connections, etc. Other details of the magneto coupling appeared in the January issue.

Ford Model "A" Engine

THIS is the third and concluding article by Mr. Pietenpol on the conversion of Model "A" Ford engines for lightplane service. In this article we are told how to complete the remaining details, how to test the engine and how to select the propeller.



Left-hand view of the converted engine mounted in the Pietenpol lightplane. Here we see the water connections made to the radiator and water tank.

idea of getting more power, and we were finally successful in our trials.

We found, that with the best make of aluminum head, the power was increased about 7 h. p. or 120 r. p. m., and at the same time we saved about 15 pounds of weight. The engine did not vibrate any worse nor did it get any hotter with the aluminum head in spite of the fact that it was developing a whole lot more power.

And I advise all of you Ford flyers to use a good aluminum head for the best results. Please notice that we have domed head shown on some of the pictures, made of sheet steel. To make the domed head it is only necessary to saw off the top of the head flush with the cylinder-head bolt holes and then screw this sheet metal head in place with small machine screws tapped into the head.

This type of head can be used only when the side type water pump is used, but it has the advantage that it will not throw the water out, no matter how hot it may get.

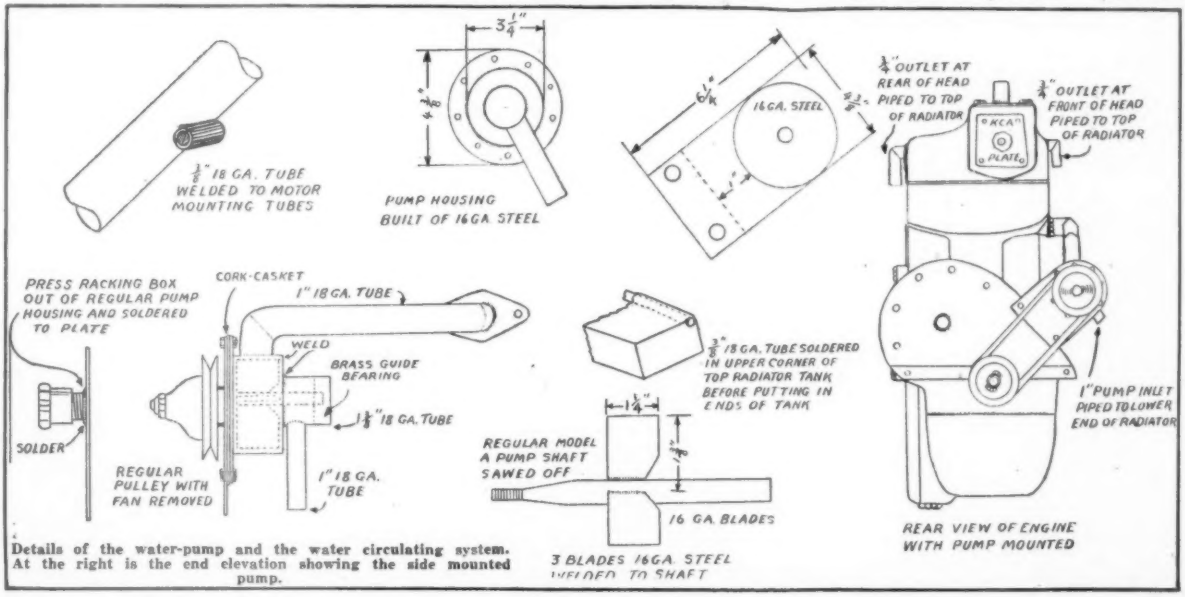
If your engine is provided with the proper size of radiator, the water temperature will go up to about 190° F. on a hot summer day. In winter, it will be necessary to cover a part of the radiator to get the temperature up as far as 120° F.

It will also be necessary to make a new valve cover plate of No. 18 or No. 20 gauge sheet steel, or better yet, of aluminum. Use the old cover plate as a pattern for marking the holes and then use a thick cork gasket when putting the cover in place.

STARTING AND RUNNING

AND after all of these alterations have been completed, we will be ready to give the engine a test. It may sound foolish to give instructions on starting and running the engine to a man who knows enough to make these changes, but after watching a lot of the fellows start their engines by choking them, and then starting them with the throttle partly open, I had better tell you that this is very dangerous.

First, after you are sure that your engine is O. K. and ready to start, put in some aircraft gasoline. Don't use


⅛" 18 GA. TUBE WELDED TO MOTOR MOUNTING TUBES
3¼"
PUMP HOUSING BUILT OF 16 GA. STEEL
16 GA. STEEL
¾" OUTLET AT REAR OF HEAD PIPED TO TOP OF RADIATOR
¾" OUTLET AT FRONT OF HEAD PIPED TO TOP OF RADIATOR
"KCA" PLATE
PRESS RACKING BOX OUT OF REGULAR PUMP HOUSING AND SOLDERED TO PLATE
CORK-GASKET
1" 18 GA. TUBE
WELD
BRASS GUIDE BEARING
1⅛" 18 GA. TUBE
SOLDER
REGULAR PULLEY WITH FAN REMOVED
1" 18 GA. TUBE
⅜" 18 GA. TUBE SOLDERED IN UPPER CORNER OF TOP RADIATOR TANK BEFORE PUTTING IN ENDS OF TANK
1¼"
REGULAR MODEL A PUMP SHAFT SAWED OFF
16 GA. BLADES
3 BLADES 16 GA. STEEL WELDED TO SHAFT
1" PUMP INLET PIPED TO LOWER END OF RADIATOR
REAR VIEW OF ENGINE WITH PUMP MOUNTED

Details of the water-pump and the water circulating system. At the right is the end elevation showing the side mounted pump.

automobile gasoline if you can possibly get the regular aviation gas.

Now close the throttle tight with the idling jet screwed down as far as it will go. The main jet is open 1/3 turn. Remove the butterfly choke valve from the carbureter as the choke should never be used.

With the ignition switch in the OFF position, turn the engine over fairly fast for three or four turns. Now turn on the ignition switch, and the engine should start, when given a quick pull on the propeller. Now, after being started, set the engine to idle at about 400 r. p. m. and let it run until you are certain that everything is in good condition. The engine should be warmed up gradually at low speed.

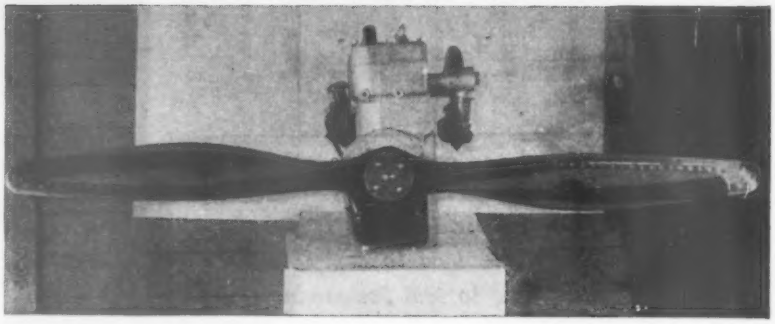
After thoroughly warmed up, the engine is to be tested for power output before any attempt is made at flying it. And the only sure method is to check up the power by using a propeller that you are familiar with, that is, a propeller that will absorb a known amount of engine power at a given speed. Then, if the engine does not turn this standard propeller up to full speed, or within 50 r. p. m. of the standard speed, do not try to fly the engine until you locate the trouble. Keep after the engine until it runs O. K.

There seems to be some difference between different camshafts even on the same make and type of engine. We seem to get the best power out of the late model Ford camshafts, but outside of using the special racing type camshafts, we have not found a thing that will increase the power like the adjustments on the carbureter, valves, intake manifolds, magneto and similar points. Some of the special heads that we have tried were worse than the regular Ford cylinder heads.

PROPELLERS FOR THE MODEL "A"

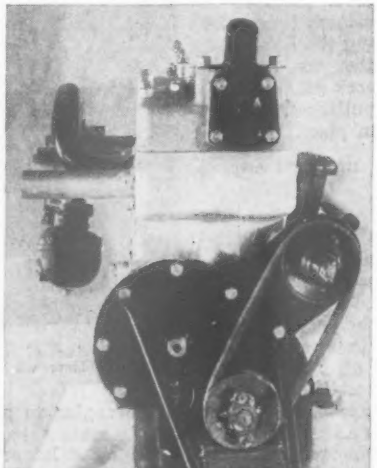
A PROPELLER can only be designed for its greatest efficiency at one speed. This should be the speed at which we wish to run our engine and also the most efficient forward speed of the ship.

Since the climbing rate of a low powered ship is the most important factor, the design should be arranged principally for a good climbing rate, and the top speed is a secondary matter, except possibly on a single seater.



Front elevation of the completed engine with the propeller mounted on the hub. The engine is now ready for installation and testing. The propeller is an essential part of the power plant, and great care should be exercised in its selection.

We have had many propellers designed for the ship we are building (the Pietenpol Air-Camper), which is a two-place Ford powered job, before we found the propeller that gave the best all around results. And while this propeller, which gave us the best results,



End view of the assembly with magneto removed from the bracket to show belt and pulley.

may not exactly fit your ship, yet it will come close to filling your needs.

First of all, the propeller must be of good design, good materials and efficient. The diameter should range from 6'-2" to 6'-6" and have a pitch of from 4'-0" to 4'-3". Next, the propeller should turn from 1,650 r. p. m. on the ground to 1,750 r. p. m. with the 4'-0" pitch. Turning the engine faster, with a smaller diameter, has no advantages.

If you have a good ship and an average engine, you can expect to take-off much quicker than the average OX-5 powered ship. With two 170 pound persons and eight gallons of gasoline, this climb will be at least 200 feet per minute while on good days I have seen the Ford powered ship climb faster than 600 feet per minute.

You may have a little bother at first due to some oil leaking out of the propeller end main bearing. This is caused by pressure in the crankcase, especially before the piston rings are seated. If you drill a ¾ inch hole in the side of the air intake on the carburetor, and connect this to the oil filler hole with a rubber hose, this will cure the trouble because of the partial vacuum thus produced in the crankcase by the carbureter suction. It is even better to connect the hose to the top and back of the valve plate cover for this makes the engine run smoother because of the oil vapor pulled over.

If you do not use the domed cylinder head, raise the tail of the ship about three feet when you fill the radiator. This is to allow the escape of air so that air-locks will be avoided.

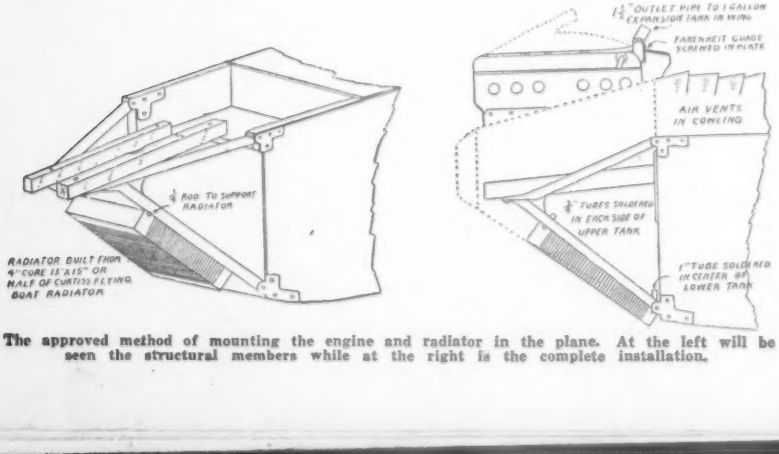
If it still throws water out of the system, before the temperature has increased to 180° F., it is possible that the cylinder head gasket is leaking or the hose connections are too small. They should be 1½ inches at least on the regular type pump and one inch on the side type pump.

Do not use an old type magneto and expect to get the best results.

THE LATE TYPE FORD ENGINES

There is so much interest in the new Ford engines, particularly the eight-cylinder "V-8," that I have carefully checked up on these engines to determine their weight and horsepower.

I find that the "V-8" is too heavy to be practical, for there is only 21 additional cubic inches in the "V-8" while the weight is very much increased. I doubt very much whether the "V-8" develops much more power than the Model "A" after it is converted .


RADIATOR BUILT FROM 4" CORE IS 4.15" OR HALF OF CURTISS FLYING BOAT RADIATOR
¼ ROD TO SUPPORT RADIATOR
1½" OUTLET PIPE TO 1 GALLON EXPANSION TANK IN WING
FARENHEIT GUAGE SCREWED IN PLATE
AIR VENTS IN COWLING
¼" TUBES SOLDERED IN EACH SIDE OF UPPER TANK
1" TUBE SOLDERED IN CENTER OF LOWER TANK

The approved method of mounting the engine and radiator in the plane. At the left will be seen the structural members while at the right is the complete installation.

New Ideas for Our Model Builders

Hints, kinks and new model flying stunts gathered from far and near for our model builders.

Model Rocket Planes Come Next

Here we have F. P. Bankiewicz holding his latest rocket model which is an interesting departure.

MR. FRANK PETE BANKIEWICZ, 1243 West 3rd. St., Cleveland, Ohio., has been conducting experiments with rocket planes for four years and sends us a picture of his latest rocket model. The model flies at a height of about 100 feet and has a duration of three minutes. He has invented the powder used and is now working on a liquid fuel to take place of the powder.

Three rocket tubes are used on the model. The two small rockets on the wings are fired together and carry the model into the upper air. When these rockets are nearly exhausted, the long central rocket tube is fired by a time fuse and prolongs the flight.

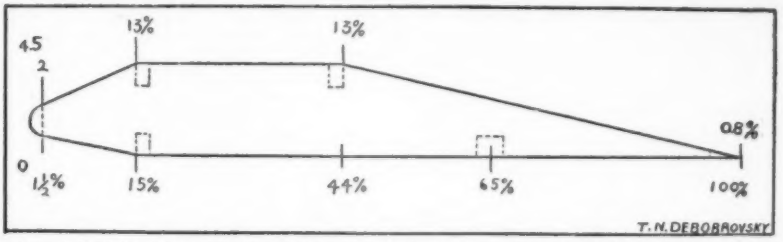
He has a new idea for checking the descent of the model when the rocket is exhausted, so that when the fuel is about burned out, a small explosive charge ejects a parachute out of its pack and this reduces the downward speed.

A New Ideal In Model Building

A NEW idea has been introduced into the model world, by the Tru-Bild Model Products Company, New York. This is the "Jig-Drawing" system which eliminates guesswork and simplifies the model builders work.

Full size drawings are employed as "jig" or patterns on which the balsa parts are assembled.

A New Model Wing Section



A layout chart for the new de Bobrovsky model airplane wing section for which its designer claims many points of advantage. Why not try it on your next model?

T. N. DE BOBROVSKY, 4 Cubberly Place, Jersey City, N. J., has designed a most interesting wing section for model airplanes. As will be seen, this airfoil presents several practical constructional advantages. First, it is easy to cut and cover when applied to the model ribs. Second, it prevents the covering from sagging when the ribs are spaced as much as four inches apart.

Mr. deBobrovsky has tested this airfoil in his wind-tunnel and it has been found very satisfactory in its general characteristics. Models tested with this section are very stable and spin proof.

The figures on the sketch show the depth of the section as a percentage of the chord, while the small dotted areas along the edges are suggestions for spar locations.

Airplane Models Show Ingenuity of Builder

THE airplane models shown by the accompanying photograph were built by Jimmie Cherry, Decatur, Georgia, each model requiring eight months spare-time work. If photographed against a suitable background, they could hardly be distinguished from full-size planes.

The model on the left is a replica of the ill-fated Mercury racing seaplane which Al Williams intended for entry in the Schneider Cup races a few years ago. It has a span of twelve inches and is complete in every detail.

The other model is a miniature Pitcairn Mailwing with a span of eighteen inches, complete in all respects, even to navigation and landing lights, upholstered cockpit, and tiny controls.

Our Model Contest Announcement

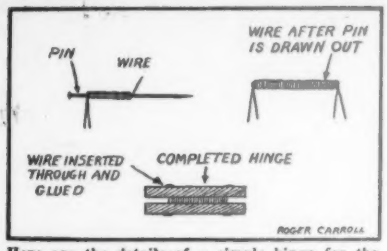
AND what a job the editors of POPULAR AVIATION have before them! A bushel of photographs from which to make the preliminary selections, and each photograph requiring the most careful attention.

And while we were always optimistic in regard to our readers' model building ability, we were actually astounded with the excellence of the models submitted. Some of the non-flying scale models show a wonderful wealth of minute detail and excellent finish, while many of the flying scale models are nearly equal to the non-scales in point of finish and workmanship.

And there will be a whole lot of interest for you in the "freak" division where we have several of the most unusual types that you can imagine.

So, hold yourselves in readiness for the time that we call for the models themselves in order to make a more careful inspection.

Rudder and Elevator Hinges



Here are the details of a simple hinge for the rudder, ailerons and elevator.

ROGER CARROLL, 710 Valley St., Maplewood, N. J., has submitted a novel form of hinge suitable for hinging rudders, elevator flaps or ailerons on models that are provided with workable controls. This hinge is made by rolling up a coil of thin copper wire, the wire being wrapped around an ordinary pin. Remove the pin. Leave a little wire at the beginning and end of the coil before cutting. Insert piece of wire in the coil and you can easily see how the hinge can be completed.

Sponge Rubber Air-Wheels

This wheel saves many a broken landing gear and is easy to make.

HERE'S what we call a mighty clever idea, a scheme for shock-absorbing wheels worked out by David R. Osborne, 7060 Rural St., Emporia, Kan. He gets a rubber sponge from the dime store and also a piece of sheet celluloid for the wheel discs.

For a two inch wheel, cut a piece two inches in diameter and 3/4 inch thick out of the sponge rubber. Two discs, 3/4 inch in diameter are then cut out of the sheet celluloid, with a hole in the center for the axle. Two holes, on either side of the center are for tying the discs and rubber together.

The discs and rubber are united by pulling fine piano wire through the outer holes, and after this is done, the rubber is rounded off to the shape of an airwheel or balloon tire. This makes a very good job and absorbs heavy landing shocks very effectively.

Trials with this wheel prove that it is an unusually efficient and simple shock absorber, although it is not recommended for an R. O. G. model because of its resistance to rotation.

A Former for Model Airplane Propellers

MODEL airplane propellers of any size up to 24 inches, and of any pitch, can be shaped on this simple adjustable former. Scraps of pine, three ¼x2½ inch carriage bolts, washers and wing nuts are the materials required.

Make a base of one inch lumber and bore the bolt holes, countersinking for the heads. As one bolt must move sidewise, cut a curved slot having a radius of 4 inches.

Make seven leaves, 3/16x2¼x12 inches, which form the adjustable table of the jig. Round one edge of each. Clamp them together when slightly spread at one end, before boring the 5/8 inch bolt holes and assemble with the base.

Since, for a true-pitch propeller, the pitch varies from the vertical at the hub center to nearly the horizontal at the end of the blade, the former leaves must lie accordingly. To align the inner corners, make a cam-shaped catch having a right angled notch to fit the leaf corners in. It is pivoted on a bolt so that it can be swung back out of the way when the leaves are clamped.

Mark one inch divisions on the upper leaf, labeling them with figures representing the diameter of the propeller.

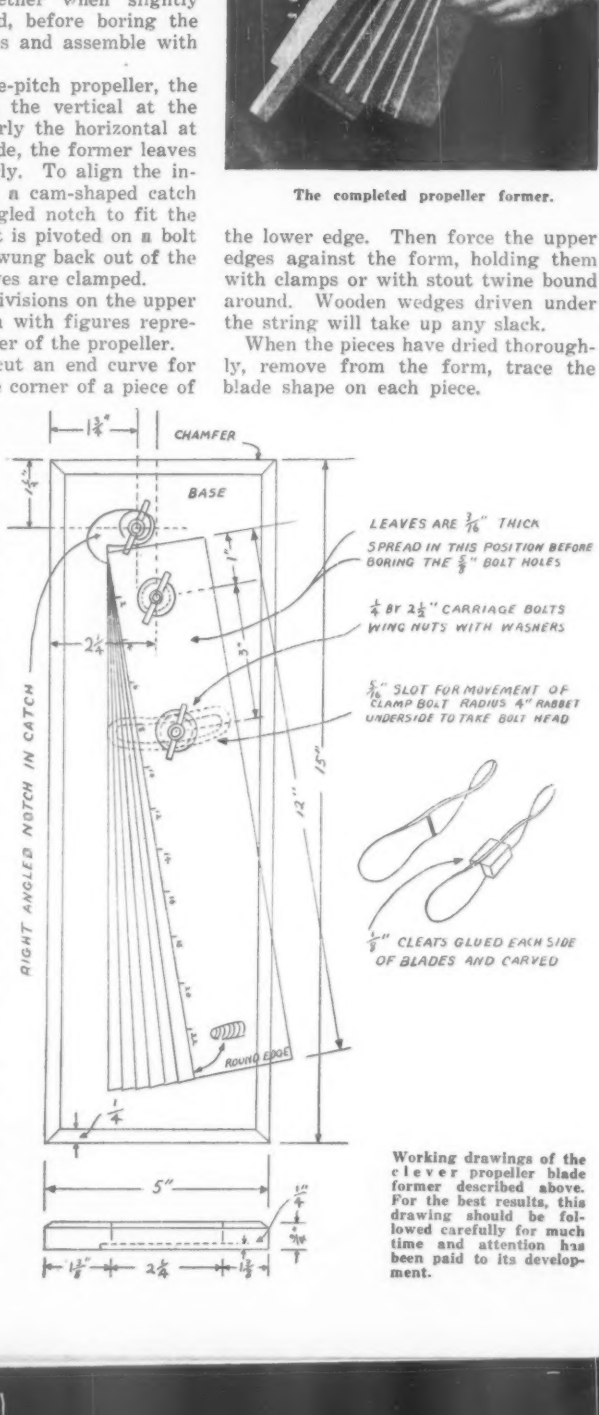
To set the jig, cut an end curve for the blade from one corner of a piece of pasteboard. Since the blade, after forming, will spring back somewhat toward its original flat shape, the twist must be exaggerated about 25 percent. Thus, if the desired pitch at the tip is 1x2 inches, make the template 1 x 2½ inches.

Prepare blanks of the desired thickness, either of balsa or pine. Cut to length and make wedge-shape so that the narrow ends are as wide as the hub thickness (from front to back) and the wide end is sufficient to cover the form at the prop tip. Boil the pieces in water for a few minutes and stand them on edge against the jig, the narrow ends flush with the pivot-ends of the leaves.

Clamp a strip of wood against the lower edge. Then force the upper edges against the form, holding them with clamps or with stout twine bound around. Wooden wedges driven under the string will take up any slack.

When the pieces have dried thoroughly, remove from the form, trace the blade shape on each piece.

The completed propeller former.


CHAMFER
BASE
LEAVES ARE 3/16" THICK
SPREAD IN THIS POSITION BEFORE BORING THE 5/8" BOLT HOLES
1/4 BY 2 1/2" CARRIAGE BOLTS WING NUTS WITH WASHERS
5/16" SLOT FOR MOVEMENT OF CLAMP BOLT RADIUS 4" RABBET UNDERSIDE TO TAKE BOLT HEAD
RIGHT ANGLED NOTCH IN CATCH
ROUND EDGE
1/8" CLEATS GLUED EACH SIDE OF BLADES AND CARVED
5"

Working drawings of the clever propeller blade former described above. For the best results, this drawing should be followed carefully for much time and attention has been paid to its development.

A Replica of the Gee-Bee

by GEORGE G. HAYDEN

These non-flying models are interesting to make and are beautiful ornaments for the home.

BUILD this ornamental scale replica. This one should be among your collection because of the interest that attaches to this speed plane that has repeatedly broken speed records in the United States.

The cowl is a solid piece of wood, turned in a lathe so that it will be perfectly round. This is then attached to the main part of the body by drilling a hole into each one of these pieces, using a short dowl and applying cement to all units, pushing them together. The nose or cowl must rest flush against the body with no space showing.

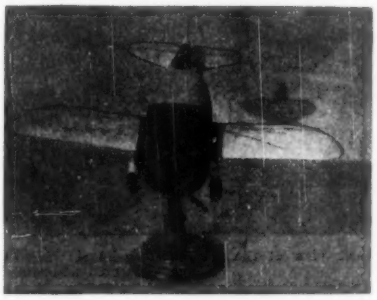
The sections of the body, to the rear of the cowl, take on an oval shape and taper quickly to a sharp wedge at the end of the rudder. Note that the rudder is very thick and moves in circular path. The large machine is very sensitive in flight and very little movement of the rudder is necessary to keep it under control.

A few sections of the body are illustrated. The rear of the body, including the fin and the rudder may be a continuous piece. However, that part of the fin and rudder which extends above the cockpit, may be added as a separate piece if so desired.

The stabilizer and the elevators are made up as left and right hand units and are cemented to each side of the body. When attaching these parts, push a pin into the body, only part way, apply the cement, then force a part of the pin into the part being attached. The correct sections of the stabilizer, elevators, fin and rudder are shown on the top and side views of the drawing.

The tail-wheel should be made to revolve and is set into a very small boot, cemented to the lower end of the body. A pin may be used for an axle and should be pushed through the boot and wheel until the head rests on the side. The extended piece should be cut short and filed down against the outer side of the boot.

A left and right wing are cut to shape and streamlined to the proper section. Near the body, a small narrow piece, a trifle longer than the wing



Here is the finished replica mounted on its pedestal.

depth, is attached at the point which will receive the wing and is sanded to conform to the shape as shown on the front and top views.

When attaching the wings, do not forget to use pins for attaching the stabilizer. The wings should be very rigid and strong, as the landing gear is cemented to the wing and not to the body.

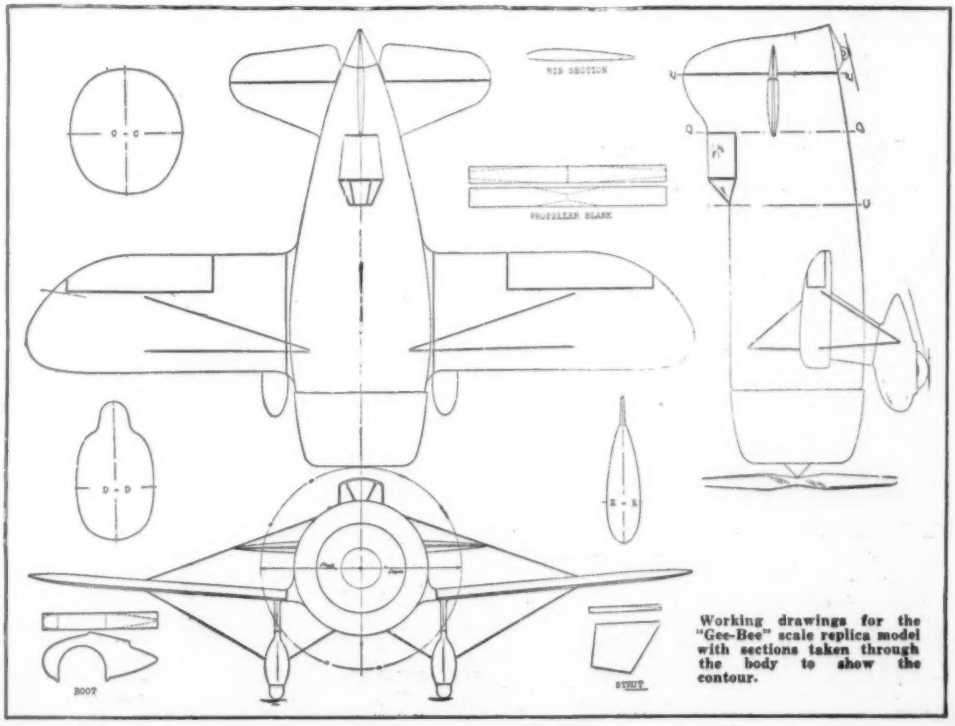
The landing gear strut is cut to shape and the center part of the boot. These two units are then cemented together. Make one left and one right unit. On top of each side of the boot a thin piece is added and the wheel should fit on the inside with enough space to revolve freely.

With a pointed knife, cut out sufficient material to form a cockpit at the position illustrated on the side view. Care should be taken so that the inside of the cockpit does not appear rough after the job is completed. The windshield is added in two sections. Small lines are drawn to represent the framework.

The propeller should be cut out and a small bushing may be inserted to represent a hub. Small brass tubing can be secured with a center-hole no thicker than a large pin. In this way, the propeller will revolve very freely. After the entire model has been assembled and all of the pieces put in their correct place, apply two or three coats of dope, sanding carefully after each coat and filling the thick cracks. The color scheme is red and white.

The outlines of all the controls are

(*Concluded on page* 118)



Working drawings for the "Gee-Bee" scale replica model with sections taken through the body to show the contour.

EDITOR'S NOTE: *We wish to thank the Granville Brothers Manufacturing Company, Springfield, Massachusetts, for supplying the original drawing.*

Making a Tunnel Boat Model

by GEORGE DOBRUSIN

This model speed boat, propelled by a rubber motor, is a highly successful working model of a well known type of racing boat.

THE model boat described here is of a type that is known as a "tunnel boat." The construction is remarkably simple as there is no twisting nor warping of the planking forming the contours of the boat. It is constructed entirely of sheet balsa with which model builders are familiar.

The tunnel is a long groove in the bottom of the boat. It is wide at the bow, but grows narrower as it approaches the stern. As the boat rides along, the water fills the tunnel and tends to raise the hull out of the water which, of course, decreases the resistance between the boat and the water.

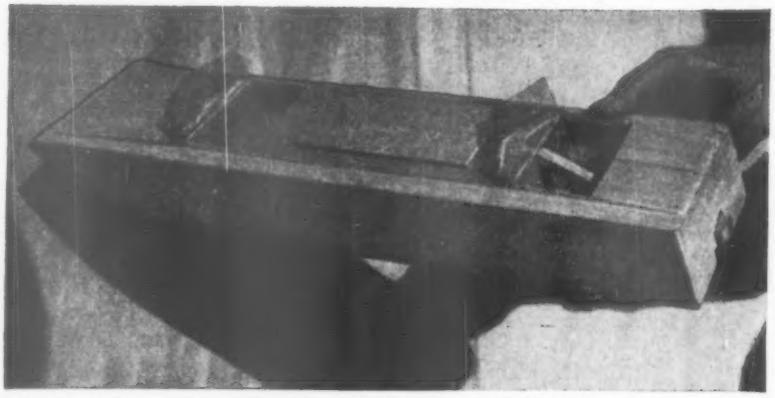
Before starting the actual construction, it would be advantageous to study the drawing carefully and become familiar with the various parts and their relation to each other.

The actual construction of the boat should be started in this way. The sides of the boat are made first. They consist of balsa 2 inches wide, 20 inches long and ⅛ inch thick. The two sheets are placed one on the other, pinned, marked out and then cut so that they both come out alike.

The stern end tapers in a little. This is done by cutting away a wedge shaped piece that is marked ½ inch at the top. The curved portion at the front does not follow any definite radius, but is made so that the curve is gradual. A square tip of ¼ inch is left. A small nose block will be glued to this later.

With the sides finished, next make the forms or stations according to the dimensions of the boat. Mark off on the sides of the boat the positions of the stations, 5 inches apart. Now place the side pieces on the lines of the oblong and pin in place. Then put in place the formers according to their number and glue in place, using the usual celluloid cement.

After the glue has set, glue on the two outside bottom planks, taking care to see that the edge of the plank lines up with the corners of the cut out sections of the formers. These planks are ⅛ inch thick. Pin in place to make sure that there will be no open joints.



Deck view of the completed model showing the hatches, steering wheel and windshields. It can be decorated according to the taste of the builder.

BUILDING a model speed boat is an interesting diversion from model airplane construction and well worth trying.

Practically the same basic material, balsa, is employed in both the model boat and airplane, so that the airplane model builder will be right at home when building this boat.

The front end of the plank is not bent down until the glue on the other joints has set, and an anchor block glued in place. This block is ½ x ½ x 5 inches long and is placed on the inside of the bow even with the square tip on each sidepiece. When this has dried well, trim it to the contour of the sides.

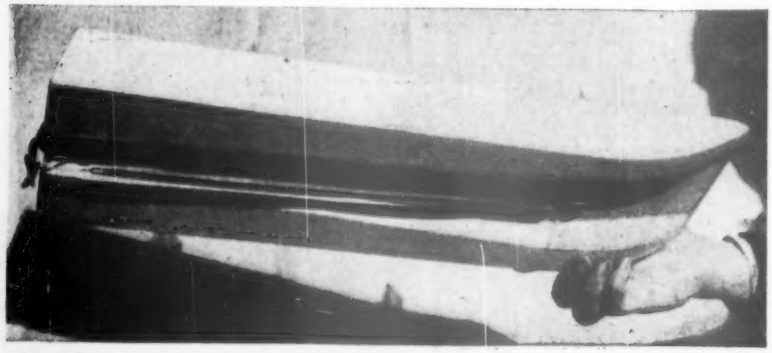
Now bend the bottom planks down over the curve end, use glue and pins, fastening them to the anchor block. Next, glue the plank in the center of the tunnel. This plank is ⅛ inch thick. The anchor block will have to be cut away somewhat, to conform with the curve formed by the center plank when it is bent. After the plank has dried well, the hull may be removed from the paper to which it was fastened, and all excess wood trimmed away.

The sides of the tunnel are placed next. These are $\frac{1}{16}$ inch thick and extend from the rear and forward to station No. 4. In the last 5 inches, the sides of the tunnel are all covered by short pieces, the grain of which runs at right angles to the rest of the planks. These have to be trimmed to fit. This completes the bottom.

Turn the boat over and glue two strips, one on each side. These strips are ½ x $\frac{1}{16}$ x 20 inches. Two more strips of ¼ x $1\frac{1}{16}$ x 20 inches are glued edgewise next to the first two strips.

These last strips are to raise the deck up. Now taper these strips from station No. 4 to the anchor block and from station No. 2 to station No. 1 at the stern. The space from the anchor block to station No. 4 is covered with $\frac{1}{16}$ inch material. A 2 inch space is left open between station No. 4 and station No. 3 for the forward cockpit.

From station No. 2 to the front cockpit, $\frac{1}{16}$ inch material is again used for covering. The rear cockpit is made by covering up only part of the section between station No. 1 and station No. 2, leaving 2 inches open for it. Between the two cockpits, two pieces of sheet balsa are glued to form the dummy motor hatch. These pieces are 4 inches long.



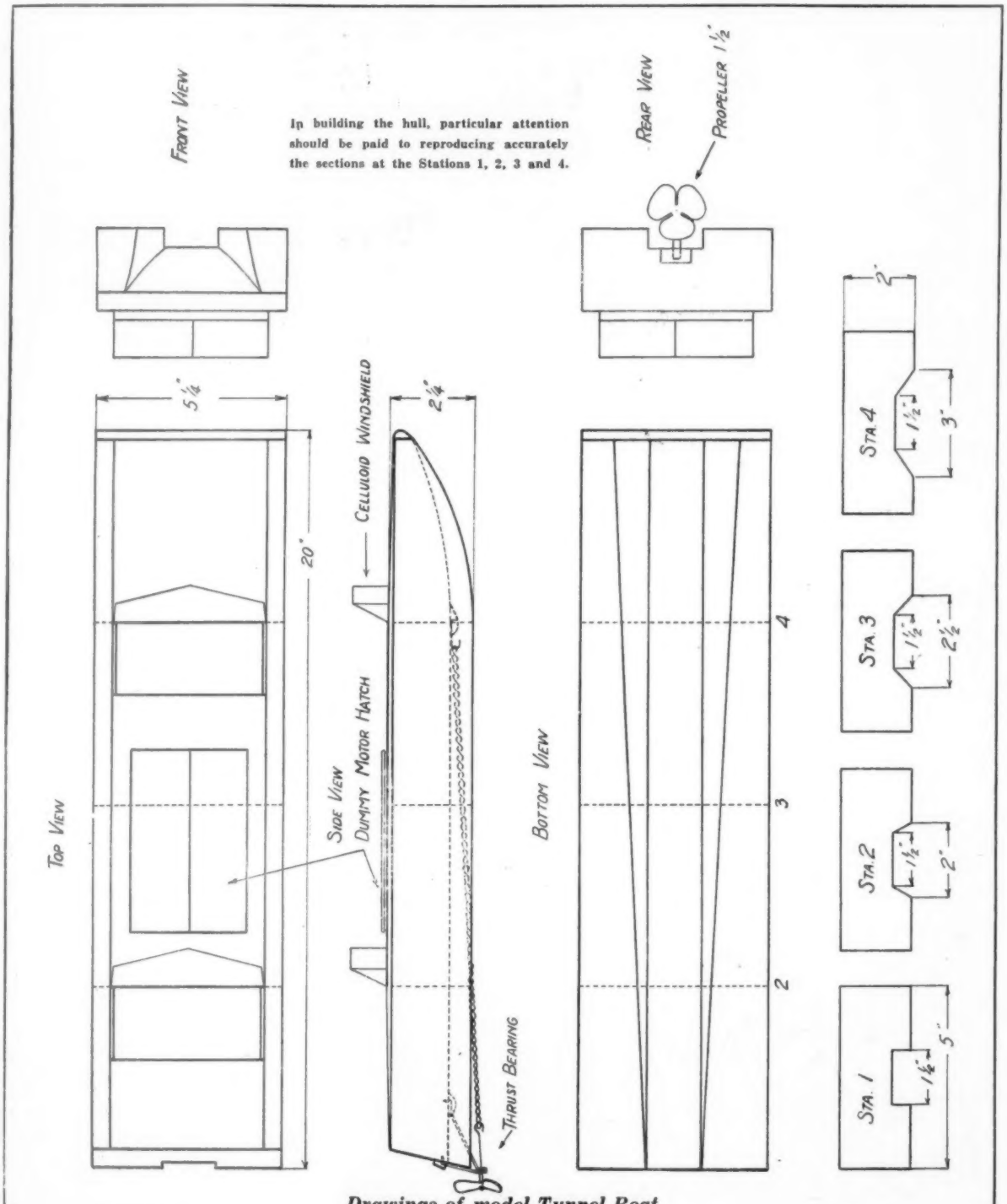
Bottom view of the completed speed boat showing the tunnel, the rubber motor and the brass propeller.

The wind shields are of celluloid and are 1 inch high.

A small block of balsa is now glued to the front end of the boat and dressed down to shape.

The propeller is made of sheet brass. It is 1½ inch in diameter and has 3 blades. The propeller shaft is made of tinned piano wire and is soldered to the propeller, one end being left long enough to form a crank with which to wind the rubber motor. The front hook is of piano wire, and is held to the boat by a streamline block of wood which in turn is glued to the boat inside the tunnel at station No. 4.

The thrust bearing is made of brass strip 1/32 inch thick and $\frac{3}{16}$ inch wide. It is made just big enough to give the propeller clearance, and is held in place by small blocks of wood and glue. From two to four strands of rubber are used. Sandpaper the boat well, fill all the cracks there may be with a wood filler and give it about three coats of shellac, sanding in between coats.



Drawings of model Tunnel Boat

Building the Monocoupe, Model 110

by

JOSEPH S. OTT
Model Editor

This is a true flying scale model of neat appearance and good flying ability.

THE general specifications of the large machine are as follows: Warner Scarab Engine, seven cylinder, 110 horsepower; weight of large empty machine, 1,031 pounds; wing section, Clark Y; Dihedral, 1 degree; and angle of incidence 0 degree.

The propeller diameter is 84 inches. The wing span of the large machine is 32 feet; body length overall 20 feet 4 inches; chord 5 feet; stabilizer width 8 feet six inches; stabilizer depth 3 feet 3½ inches; rudder height 4 feet ½ inch; fin depth 1 foot 11 inches and rudder depth 2 feet, 4½ inches.

The completed 22 inch model weighs ready for flight, a trifle less than ¾ ounce.

WING CONSTRUCTION

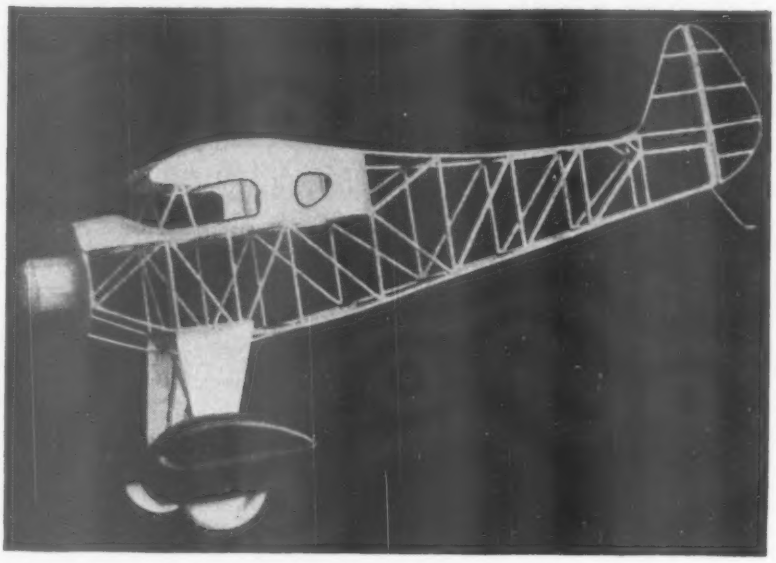
THE entire wing is built up in one piece and is split at the middle with the dihedral added at each wing tip. The windows are put in and the entire wing is covered and cemented on top of the fuselage in the final assembly.

All the ribs are cut to conform to the Clark Y section which is flat on the bottom. Ailerons are shown as separate units made movable by attaching with a soft piece of wire. Attach the aileron at two points and cement the wires securely. The small pieces of wire should be attached along the side of a rib. It is not necessary that the controls in the model be made movable.

The wing tips are bent bamboo and these ends continue around and are a part of the aileron. Before putting the wing tips in place, cement the two spars for the ailerons on their position and continue the wing tip and allow to dry. Then cut the complete aileron out of the wing.

The spar in the aileron should be approximately ⅛ inch thick, and the face is rounded which allows movement of the aileron without binding. Two spars are used on the lower side of the wing and are cut to conform to the up-

(*Concluded on page* 118)

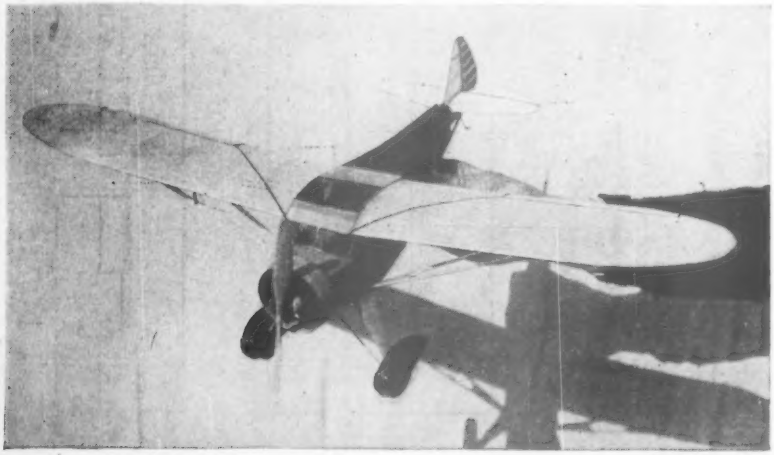


Fuselage structure of the Monocoupe Model 110 before the covering was applied. Note the sheet balsa cabin and the curved upper longeron.

List of Materials

Spars	1/16 x ⅛ x 18″	4
Leading Edge	⅛ x ⅛ x 18″	2
Trailing Edge	1/16 x ⅛ x 18″	2
Longerons	1/16 x 1/16 x 18″	8
Rib Stock	1/32 x 2 x 18″	1
Struts	⅛ x ¼ x 18″	2
Propeller	7″ Diameter	1
Motor Drum	Left overs from rib stock	
Nose bearing	½″ Diameter	1
Pants	⅜ x 1⅛ x 3″	2
Gear Struts	⅛ x 1 x 2″	2
Wing Tips	Bamboo	2
Tail Outline	Bamboo	1
Windshield	1 x 8″	
Motor	30 guage rubber	
Wheels	1¾″ Diameter	2
Washers	⅛″ Diameter	3
Shaft	.024 Diameter	1
Tissue	2 Sheets—Blue and White	
Cement	Large Tube	1
Dope	Large Jar	1

EDITOR'S NOTE: *This model is a perfect scale model of the Monocoupe 110 and was built and designed from plans furnished to the Model Department by the Monocoupe Corporation.*

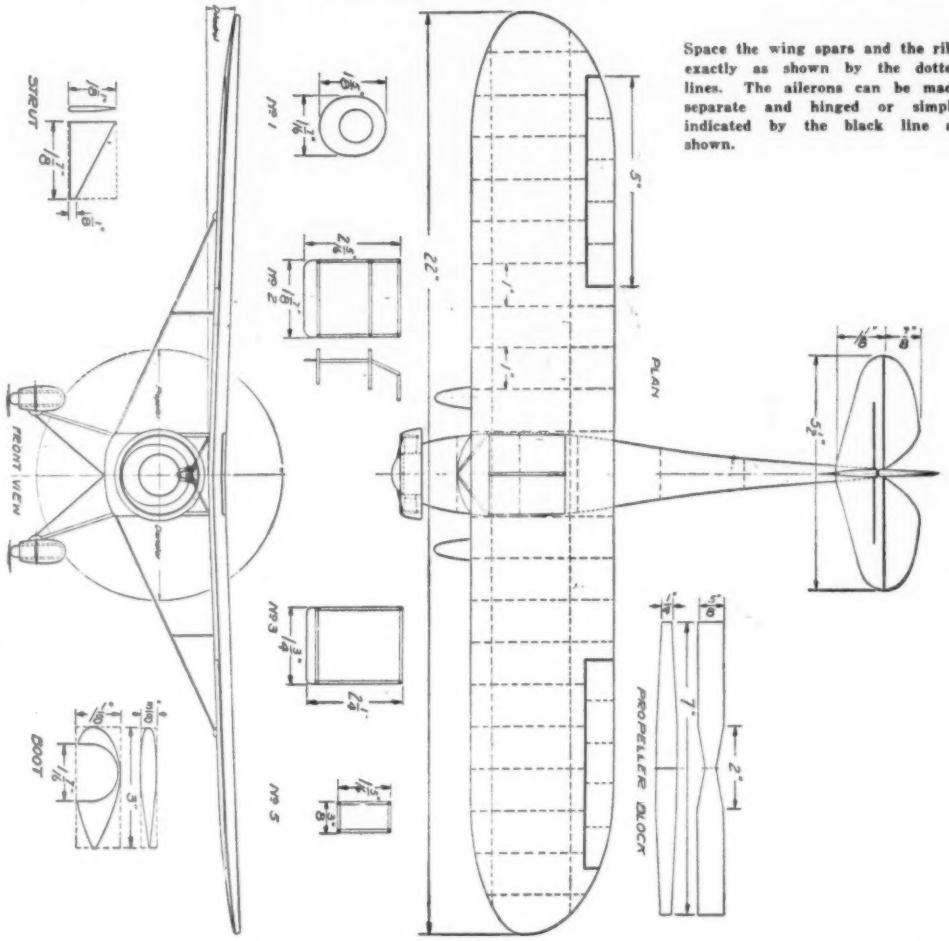


This model of the Monocoupe, Model 110, is one of the most realistic or "natural" flying scale models that we have seen.

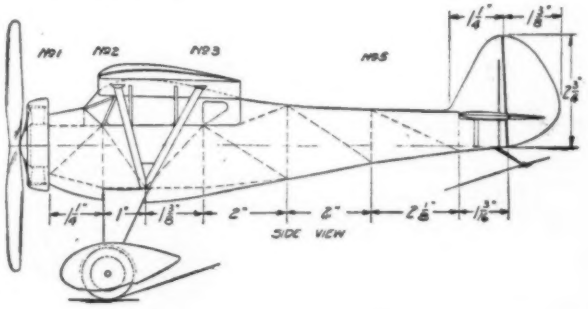
The Monocoupe, Model 110

A Flying Scale Model

The drawings below are one-quarter the size of the finished 22 inch model, and all parts can be measured off proportionately where definite dimensions are not shown.



Space the wing spars and the ribs exactly as shown by the dotted lines. The ailerons can be made separate and hinged or simply indicated by the black line as shown.



In building the landing gear be sure to leave enough clearance for the propeller when the model is standing horizontally in landing or take-off position.

When cutting out the ribs for the wings, follow the wing section very carefully. The full size rib outline for the 22 inch model will be found on the following page from which it can be traced.

Monocoupe

(*Continued from page* 116)

ward curve as seen in the front view before assembling.

BODY OR FUSELAGE

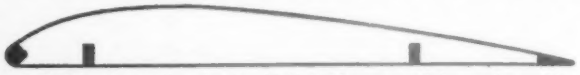
WHEN building the body, two complete side sections are assembled first. Follow the layout as seen in the side view and make one unit. Put a piece of wax paper over this first section and build a second one over it. These two units are then assembled to the form illustrated on the plan view.

The body stops at section No. 1, which section receives the built dummy motor unit. This first section is a trifle elongated and is not a perfect circle. The shape of the Monocoupe body differs from most others because it curves in immediately behind the wings and then curves back. This is noticeable on both the plan and side views.

THE DUMMY ENGINE

THE dummy engine is built up on a balsa crankcase unit with separate cylinders which may be purchased at most model stores. Two small discs and a light, circular cylinder wall comprise the crankcase. The front oval section is a solid piece of balsa.

The cylinders are then added around this completed drum and the valve rods put in place. This entire unit may be added or taken off the front of the machine. The nose plug which is also a bearing continues into the half-rounded section of the crankcase. When the propeller is removed, the shaft, plug and bearing come out as one unit.



Full size wing section for the 22 inch Monocoupe flying scale model.

LANDING GEAR

THE landing gear struts are solid balsa and are cut to conform to the shape illustrated. Sufficient height must be allowed for propeller clearance.

The center part of the wheel pants is cut to shape first. The size should fit the type of wheel at hand or obtainable. The proper size is 1¼ to 1⅜ inches. The thickness at the center part of the wheel boots will depend upon the type of wheel. The outside is covered with a thin layer of balsa.

The small brace running down from the center of the fuselage is a thin piece of bamboo, approximately 1/8 inch square and continues through the boots and is the axle for the wheel.

This method of construction makes it necessary to put the wheel and the boot on the strut at the same time. A good fit should be secured before fitting these units and cementing them down permanently. In order that the struts be very strong, they must be cemented to the longerons and not to the fairing strips of the body.

TAIL CONSTRUCTION

THE rudder and fin are built in two units. These parts should be made separate and are attached with a soft wire hinge. The adjustable rudder will help considerably in balancing the model in flight. The wing section for the tail units may be followed as illustrated.

It is not of importance to have any given section for these parts but a good average one is where the thickest part is approximately one-third back from the leading edge. Note in particular that the rudder post is not straight but slants forward. This is the way that the large machine is built and this model drawing was scaled from the original plans.

The stabilizer and the elevators are built up and covered on both sides in a similar fashion to the rudder and fin. Three ribs are used on each side. The tail unit is very small when built to scale and the model will not be quite as stable unless the speed is very constant throughout the entire length of the flight.

For this reason a tail may be added with a span of 1½ times that illustrated. The fin and rudder should also be enlarged. This is only necessary where a model is desired to fly well and not for ornamental purposes. The tail skid is built of three layers of bamboo.

MAKING THE WING STRUTS

THE wing struts are built of two thin strips each streamlined separately with an added piece at the lower end. The correct length will depend on the size of the model. The width at the outer end must conform to the space between the spars. They are reenforced a short distance in from the point where they attach to the wing and in some cases these braces will not meet at a rib.

A small compression rib should be added so that these small braces will point straight up as illustrated on the side view. The struts should be fitted and the locations checked before the wing has been completely covered.

THE MOTOR AND PROPELLER

THE propeller should be of a high pitch type to give the model plenty of speed and keep it stable while in flight because of the small tail unit. A crossline type propeller should be used with an average width blade.

Four to five strands of 1/32 x 1/8 inch good grade, flat rubber is required for the motor power. The rubber is attached at the rear directly in front of the stabilizer by a small upright piece of balsa which extends through the fuselage from below. The original model balanced without adding any additional weights and the length of the fuselage was compensated for by the added pieces of the motor and cowl.

ASSEMBLY AND COVERING

THE wing is covered with white tissue on both the upper and lower sides. The body is covered in blue and the tail units in white. The landing gear is assembled before the body is completely covered.

The stabilizer is in one piece and is attached to the body after covering. The elevators are attached after the stabilizer is securely in position. The stabilizer should be given a slight negative angle, while the main wing has no angle of incidence.

After the wing is cemented to the fuselage, the windshield is added. The wing struts are now put in position and cemented in place. The propeller and the motor may be put on at this stage.

Our next scale flying model, which will appear in the March issue, will be the Curtiss "Sparrow Hawk", also known as the "Akron Fighter".

END.

Replica Model

(*Continued from page* 113)

put on with a ruling pen and black India ink. The propeller should be painted aluminum and the hub black. When all the coloring has dried, the wires should be attached. These should be fairly thick and very stiff so that they will stay in position and not bend easily when the model is touched accidentally.

The photograph illustrates the model mounted on a pedestal the same as the Fairchild "24" in the January issue. This part is optional but helps to preserve the model and may be placed anywhere in the home.

Materials Necessary—Wood, Balsa or Pine

Body	1¾ x 2¼ x 5½"	1
Wings	⅛ x 1½ x 3¾"	2
Wing Stubs	¼ x ⅜ x 1½"	2
Stabilizer	⅛ x 1¼ x 1½"	2
Boots	⅜ x ⅝ x 1½"	2
Struts	1/16 x 1 x ¾"	2
Wheels	½" Diameter	2
Wheel Tail	3/16" Diameter	1
Propeller	2½" Diameter	1
Propeller Hub	1/16 x 3/16"	1
Windshield	1 x 1"	1
Wires	.016" Dia. x 5"	4
Cement	Clear	1
Dope	Clear	1
Red Lacquer	Vial	1
White Lacquer	Vial	1
Pins	Envelope	24

Optional — Decorations

THE replica to be described in our next issue will be a World War Spad, a plane that should be in the collection of every builder.

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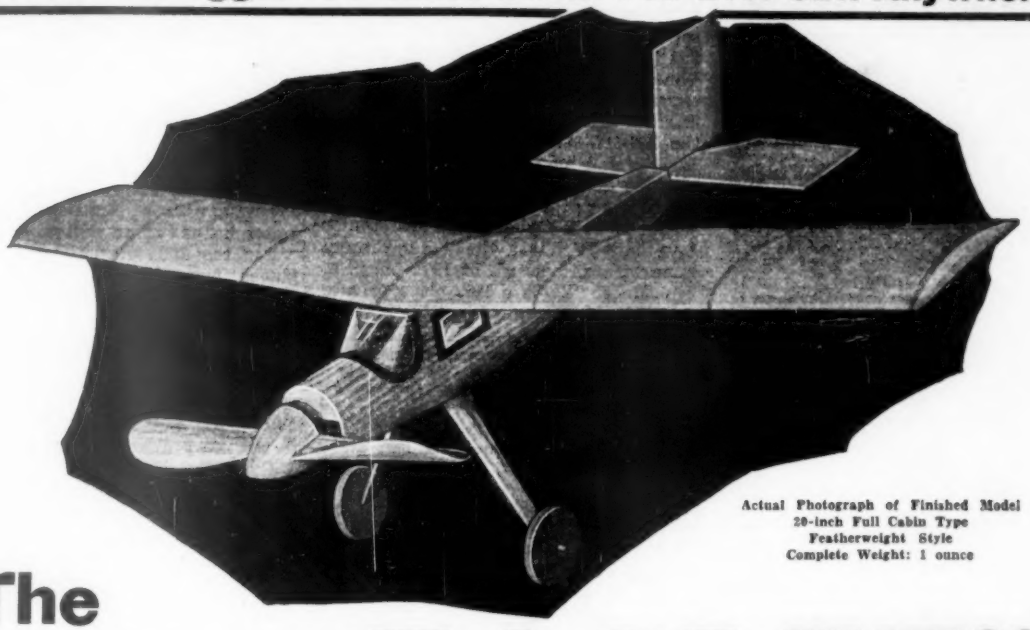


Actual Photograph of Finished Model
20-inch Full Cabin Type
Featherweight Style
Complete Weight: 1 ounce

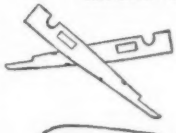
The IDEAL "EAGLET"

New 20-inch Featherweight Commercial Flying Model in Big Value Kit for 50c

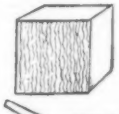
No Stamps Please—Cash, Money Order or Check. Postpaid

THIS wonderful ship will amaze you with its performance in the air. The completed Model weighs only one ounce, and this light weight combined with unusual power, secures flights that would be impossible with heavier Models. The "EAGLET" is made entirely of balsa and is constructed as carefully and accurately as many Models costing three or four times as much. Wings are "built-up" type, with combined ribs and balsa spars, covered with Japan tissue. Entirely removable and adjustable on fuselage. The whole Model is easy to construct; all parts as illustrated here, come ready to use and full instructions and plans are included. You can color the "EAGLET" to suit your own ideas, and you'll have a Model that will outshine many more expensive ones! Send your order along now!

Kit contains all parts, fittings and materials for the Model. You need only coloring dope to suit your own scheme of decoration. Every Kit contains the following:


Ready-Cut Balsa Fuselage Sides

8 Ready-cut Balsa High-lift Ribs


Balsa Block for Propeller Nosing

Ready-cut Balsa Landing Gear Struts

Balsa Strips, etc. for all Spars, Framing and other parts

7½ inch Finished Balsa Propeller of Special Pitch

Formed Wire Propeller Shaft

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Formed Wire Rear Rubber Hook

Aluminum Wing Clip for Adjustable Wings

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Tube Cement—Rubber Motor—Japan Tissue Paper for Wings and Tail Assembly—Cellophane for Windows—Washers and Eyelets for Propeller Shaft—Instruction Sheet Containing Plans and Instructions.

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Contains full description of all IDEAL Model Airplanes. Construction Kits, Ready-to-fly Models, Miniature Models, Large and Small Scale Flying Models and many others. Also big list of Materials, Parts, Accessories and Supplies. Your Model Library is not complete without this Catalog. Send 5c for a copy now.

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. . . the popular planes you see every day . . . in a class by themselves. Each kit contains full-size drawings and detailed instructions; 5 bottles colored dope and cement; sandpaper; split bamboo; pins; wheels; propellers; wing, tail surfaces and other parts clearly stamped on balsa; balsa blocks for cowling and fuselage; and required insignia.

3 for $1.00 **35c EACH** plus 5c postage for each kit

10 inch BOEING PURSUIT XP936

A beautiful replica of this famous plane. Complete 35c plus 5c postage)

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One of the most striking models we have ever seen. Complete 35c (plus 5c postage.)

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A replica of that record-breaking plane. Complete 35c (plus 5c postage.)

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20" Sheet Balsa

1/64 x 2.....5 for 8c
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Washers — Large or small 2 doz. 3c; Gross 14c.

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1/32 or 1/16", 6 ft. 3c

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1/16" O.D., per ft 6c
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Celluloid Wheels in all colors

3/4" diam., pr. ... 4c
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Banana Oil

2 oz. 7c; pt. 48c

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2 oz. 7c; pt. 48c

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Small 14c; Large 25c

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All colors and clear 1 oz. 7c; 2 oz. 10c; pt. 60c

Acetone

Colorless Cement 1 oz. 8c; 2 oz. 12c; pt. 70c

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Small or large, each 1½c

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1/16" flat, 50 ft...12c
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Jap Tissue—Red, yellow, blue, orange, green purple and white 5 sheets 10c

Music Spring Wire

.014", .020", .028", .034" 18 ft.....5c

Double-Geared Winders

Each 25c

Include 15 cents to all orders up to $1.50. Orders over $1.50 add 10% for packing and postage.

No discount on above prices. No catalogs sent.

STAR MODEL AERO SHOP
10 - 12 Pearl Street Newark, N. J.

Air-Cooled Racers

(*Continued from page 96*)

set an unofficial land plane record of 281 m. p. h. James Wedell, in the Wedell-Williams, was second with an average of 227.9 m. p. h. and Dale Jackson in a Laird Solution, similar to the LC-DW 300, but powered with a Wright J 6 motor, was third with an average of 211 m. p. h. Doolittle was forced out of the race by motor trouble.

Maude Tait, flying a Gee Bee Senior Sportster "Y," won the Aerol Trophy Race with an average of 187.5 m. p. h. The Model "Y" is a two place private sport plane powered with a Wasp or Wasp Jr. motor, but its speed is in excess of 200 m. p. h.

Two other interesting planes at the Races were the Keith-Rider planes. They were extremely small all metal monoplanes with retractable landing gear. I don't know any of the details other than that one was powered with a 6 cyl. 160 h. p. Menasco in-line motor. It had a high speed of about 240 m. p. h. and won the 800 cu. in. free-for-all with an average of 185 m. p. h. The other was exactly like it but was powered with a Menasco 4 cylinder motor instead of an in-line.

For the 1932 Races, special racing planes were built for nearly every power range from 100 h. p. up. But probably the only new type was the gull wing Springfield Racer designed and flown by Robert Hall. It was a clean and speedy looking plane powered with a Wasp supercharged to about 700 h. p. But considering its power, it was very slow.

Granville Brothers built for the Springfield Air Race Association, two Gee-Bee's, (1) the R-1 for the Thompson Race and (2) the R-2, for the Bendix Race. With the exception of the motor, they were identical in construction and similar to the Model "Z" being slightly larger.

The R-1 was powered with a Wasp motor supercharged to about 800 h. p. and weighed 1,840 pounds empty. Flown by James Doolittle, this plane won the Thompson Race with an average of 252.6 m. p. h., also won the Shell Speed Dashes and set a world's land plane speed record of 296.28 m. p. h.

The R-2 was powered with a Wasp Jr., supercharged to 550 h. p. and weighed 1,796 pounds empty. It placed fourth in the Bendix Race and averaged 247.39 m. p. h. in the Shell Speed Dashes, also a classic.

James Wedell rebuilt the racer that he flew in 1931 and built two new ones which were flown by James Haizlip and Roscoe Turner. The Wedell-Williams Model 44 was powered with a Wasp Jr. motor supercharged to 550 h. p. They won first three places in the Bendix Race.

Jimmy Haizlip won first with an average of 246 m. p. h. and continued on to New York to set a new transcontinental record of 10 hours 19 minutes. They also won second, third, and fourth place in both the Thompson and Shell Speed Dashes—James Wedell averaged 277 m. p. h. in the Shell Speed Dashes and James Haizlip won the 1,000 cubic inch free for all.

Besides his old Gipsey powered racer, Ben Howard had two new low wing monoplanes at the Races. With the exception of the landing gear they were identical in construction and were powered with 160 h. p. Menasco in-line motors. Gladys O'Donnell won the Aerol Trophy Race with an average of 185.47 m. p. h. Ben Howard also averaged 213.47 m. p. h. in the Shell Speed Dashes and the planes also placed in several minor races.

END.

PRIZE WINNERS!

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H. Sutton, Jr., Summit Ave., Kinston, N. C., $5.00; Wm. Richter, 917 W. 6th Ave., Gary, Indiana, $3.00; Dean McKone, 4702 Sims Ave., Baltimore, Md., $2.00.

Winners of Selley's Slogan Contest will be announced in the next issue. Look for your name!

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Diameter	Anti-Drag	Open Cowl	Closed Cowl
1½"	.20	.20	.20
2"	.25	.25	.25
2½"	.28	.30	.30
3"	.30	.35	.35
3½"	.40	.45	.45
4"	.50	.55	.55

Cowls made in 4½, 5, 5½, 6, 7, 8, 9, and 10" diameters. Packing and Postage, 6c each.

PROPELLERS

CAST METAL

SPINNER TYPE STANDARD STEEL TYPE

2 Bladed	3 Bladed	2 Bladed	3 Bladed
3¼" .25		3¼" .20	
4" .30	4" .35	4" .25	4" .30
4½" .35	4½" .45	4½" .25	4½" .40
5" .35	5" .50	5" .30	5" .45
5⅝" .40	5⅝" .60	6" .35	6" .60
6¼" .40	6¼" .70	6½" .45	
7" .55	7" .80	6¾" .50	7" .70

Props made in 8", 9", 10", 11", 12", 15", 18", 21" and 24" dia. Postage 6c each up to 12" dia. Shaft and Bushing 10c extra.

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The largest and lowest-priced selection in the world.

Alum. Disc Rub. Tired Tail Wheel		Aluminum Disc Rubber Tired Air Wheels		Celluloid Untired	
½" dia.	5c ea.	1" dia.	18c pr.	¾" dia.	6c pr.
⅝" dia.	6c ea.	1¼" dia.	20c pr.	1" dia.	8c pr.
¾" dia.	7c ea.	1½" dia.	25c pr.	1⅜" dia.	10c pr.
⅞" dia.	8c ea.	Treaded Rubber Aluminum Disc		1⅝" dia.	16c pr.
1" dia.	9c ea.	1 3/16" dia.	30c pr.	1⅞" dia.	40c pr.
1⅛" dia.	10c ea.	1½" dia.	40c pr.	Celluloid Pants	
1¼" dia.	11c ea.	2" dia.	50c pr.	¾" or 1" Whl.	25c pr.
Balloon Tire Alum. Disc		2½" dia.	60c pr.	1⅜" or 1⅝" Whl.	30c pr.
1½" dia.	25c pr.	3" dia.	$1.25 pr.	Celluloid Air Wheels	
1¾" dia.	30c pr.	Balsa Wheels Balloon Tire Shape		¾" dia.	8c pr.
2" dia.	40c pr.	½"	5c pr.	1" dia.	10c pr.
		¾"	6c pr.	Bal. Tired Cel. Disc Whl.	
		1"	7c pr.	1½" dia.	30c pr.
		1¼"	8c pr.	1¾" dia.	35c pr.
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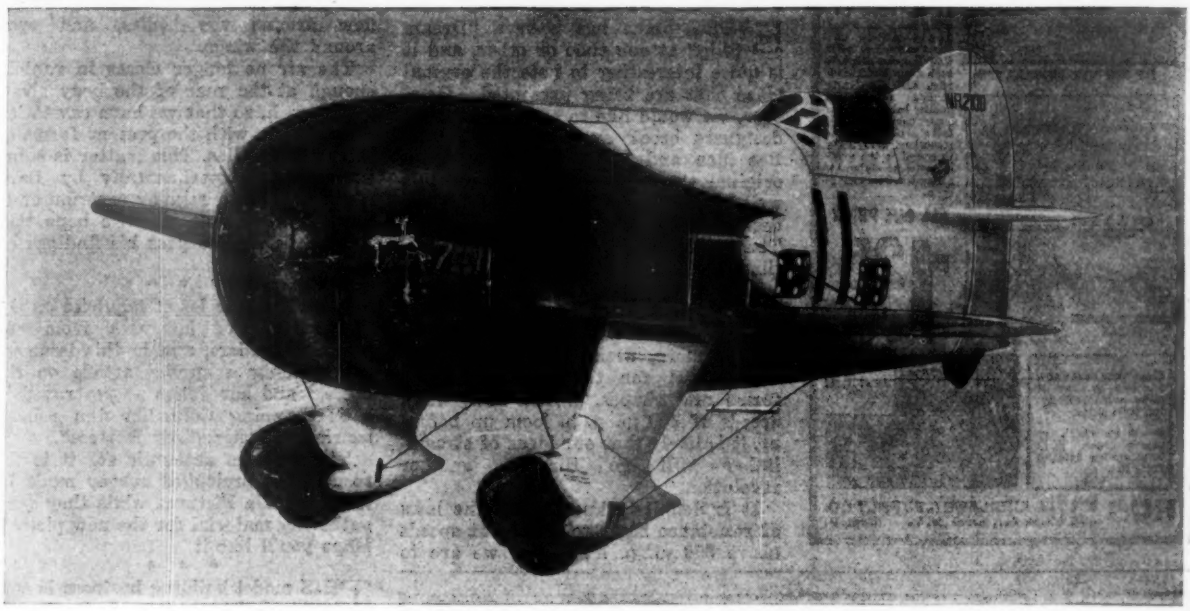


All pictures on this page are of actual Cleveland-Designed models not artificially retouched sketches. We NEVER use photos of the big ships themselves advertising our models

Kit N-2 for Doolittle's GEE-BEE SUPERSPORTSTER $1—Combination Kit N-1: Heath Parasol and Primary Training Glider (3/8") $1

These Kits were originally developed ONLY for readers of our new engineering service in magazine form, the "CLEVELAND MODELMAKING NEWS and Practical Hobbies"—but we know thousands of other model enthusiasts will also want them. Each Kit is thoroughly complete with all materials necessary to build these models—EXCEPT that there is no drawing. The full size ¾" scale Cleveland-Designed drawings for these models are FREE—but are given ONLY with the first issue of the above mentioned magazine which sells at 25c per copy as long as the supply lasts. You may subscribe to our magazine if you wish—there will also be two more large ¾" scale drawings and a ⅜" soaring glider along with many other smaller models in the March-April issue—see coupon for rates.

THESE two Kits (or rather 3, for the Heath is 2-Kits-in-1) are "the buy of a lifetime." It marks a new era in the model world due to the many past achievements of Cleveland Model & Supply Co., Inc. And there will be more to come.

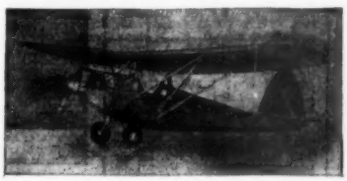
Look at 'er Zoom!

LET'S talk first about the C-D model of the Gee-Bee Supersportster. It's an authentic ¾" scale miniature of the "super racer" that was piloted to victory in 1932 by Major James H. (Jimmy) Doolittle for the coveted Thompson Trophy at the Cleveland Races. His plane is known as the Gee-Bee Supersportster Model R-1 which in speed tests made 309 m. p. h. in the first lap, with an average of 294.39 m. p. h., this was officially credited as the world's landplane speed record. This C-D model is the most beautiful we have ever produced. Built for exceptionally realistic appearance, it should also interest solid scale model builders because of its radically new features, still it can be made to fly by employing larger stabilizer surfaces as suggested on the drawing. The complicated parts are fairly simple, but require plenty of time because of the abundance of detail. When finished it is a job you'll be proud of for the rest of your life. Span 18¾"; length 13⅝"; weight 2.7 oz. Kit contains all necessary high quality, firm stock balsa wood, very accurately cut, all necessary Japanese paper, fiber propeller blades, prop hubs, music wire, hinge wire, thread for brace wires, celluloid, Cleveland colorless cement, paper cement, and other things as well as the much talked about new Cleveland Enamel Dopes, both red and white. At this startlingly low price you needn't risk "cheap" materials. Complete Kit N2, post-free and sold only direct from our factory, $1. Send for yours today—no waiting—we have thousands all ready to ship.

Our New Magazine

"CLEVELAND MODELMAKING NEWS and Practical Hobbies" is a simplified engineering service for modelmakers, in magazine form. It devotes itself to authentic models of airplanes that fly, ships, trains, complete railroads and equipment, tiny ½" scale planes, small machinery and other fascinating subjects. No theory. Every plan designed, tested and approved at the workbench. Valuable hints, articles, data, and FULL SIZE drawings. Not sold on newsstands. Large ¾" scale drawings of Gee-Bee Supersportster and Heath Parasol and many other drawings, 5 of them being ½" scale solid exhibition models (a regular feature each issue) FREE with the first issue—now ready. No strings attached to this offer. It may seem too good to be true but it's a brand new model engineering service. Supply of the first issue is very limited. See coupon for rates. Act quick!

HEATH Parasol lovers will find this the authentic model they've been waiting for—and in addition will receive, at no extra cost, all materials for making the Primary Training Glider. This Kit contains all the necessary materials, just as supplied with the Gee-Bee model (with the exception of the dope for the Glider wings, where Cleveland old model dope is supplied instead of the new enamel dope because of the very light structure of the wings). At this low price no model enthusiast should be without the C-D Heath, for it's fairly simple to build and flies beautifully. Span 23⅜"; length 12¾"; weight 8/10 oz. Order this Kit right along with your Gee-Bee, and remember it also includes all materials for making the ⅜" scale Primary Training Glider. Sold only direct from the factory. Order Kit N-1, postfree, only $1.



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I enclose $.....for which please rush items checked:

- ☐ Kit N-2: Gee-Bee Supersportster (complete except for drawing) $1.
- ☐ Kit N-1: Heath Parasol and Primary Training Glider (complete except for drawing) $1.
- ☐ Sample copy of CLEVELAND MODELMAKING NEWS and Practical Hobbies (first issue brings large ¾" scale drawings of above models FREE) while they last, 25c.
- ☐ Subscription for 6 issues of CM News & PH (including first issue) $1. (Saving, 50c).
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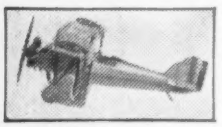
24" NEW FOKKER HOSPITAL SHIP

HERE THEY ARE! All big ships, (24" wingspan), all flying scale models, and what marvelous gifts they'll make. All parts including bulkheads, ribs, etc. All clearly stamped on highest quality balsa. The kits come complete with full size plans and instructions everything to complete the models, attractively boxed. All models 2 foot wingspan.



22" U. S. NAVY "CORSAIR"

24" U. S. MARINE FALCON

ALL ONE PRICE

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Place your order now for one or more of these wonderful flying scale ships.

Remit by check or money order. Send 3c stamp for detailed Price list.

24" U. S. ARMY HAWK

HUB MODEL AIRPLANE & SUPPLY CO.
475 Brook Av., Bronx, N. Y. (Dept. P)

Airy Chat

(*Continued from page 74*)

EVERY plane has been a "Dream Ship" at one time or other, and it is quite interesting to note the orginal ideas that are being presented. However, we would like to see our amateur designers break away from the Gee-Bee idea and tackle something more original than the stubby body of this well known racer. Why not tackle the design of a low priced sportplane? That is what we really need in these times.

* * *

THIS matter of streamlining has always been more or less a matter of argument, even with a great big wind-tunnel for testing the various forms and shapes. And now, when speeds of 400 m. p. h. loom up before us, it is likely that our ideas of streamlining will go through another revolution.

It is definitely known that the laws of resistance begin to change at speeds above 350 m. p. h., and if we are to attain speeds greater than 400 m. p. h., we will be compelled to modify the present streamline forms to accomodate them to the new condition of air flow around the bodies, and even around the wings.

The air no longer closes in rapidly enough at the rear of the body above 350 m. p. h. so that we have cavitation taking place with the present forms of streamline bodies. This matter is being investigated experimentally by Lawrence J. Lesh, a regular contributor to POPULAR AVIATION, and we hope that we will be able to pass his findings on to our readers.

* * *

WE'VE had a lot of inquiries on the subject of hostesses from our feminine readers, and in this issue we are running a special article on the hostess and her duties as portrayed in a forthcoming Columbia film release bearing the title: "Air Hostess".

This dope is authentic for it is the result of a prolonged survey made by the Columbia Pictures while they were gathering material for the new picture. Hope you'll like it.

* * *

THIS model building business is contagious. The writer, J. B. R., has been more or less connected with airplane models ever since 1909, but he has never seen such activity before in this line. Big and little, old and young, they are deserting ping-pong and bridge tables for model building. It is the most fascinating hobby on earth, so why don't you get into the game?

* * *

PURSUING the subject of models, it is interesting to note the many changes that have taken place in model building materials and methods during the past 23 years. In the first place, the use of balsa wood has so reduced the weight of models that almost any old model will fly to some extent, which was not the case in the old days with basswood, spruce and other heavy woods.

We now have decent rubber for

THE MOST EASILY BUILT MODELS YOU CAN BUY!

Some Models Don't Fly!

Many "flying" models DO NOT FLY. Before you buy ANY model set read the advertisement to see if the manufacturer says how far his models fly.

If the manufacturer does not say how far his models fly you can take it for granted that they DO NOT FLY WELL. If a manufacturer doesn't advertise the distance his models fly, it may be because he's ashamed to!

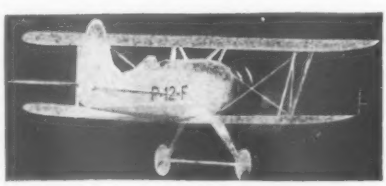
Be ABSOLUTELY CERTAIN the manufacturer HIMSELF makes a flight claim. Some firms use testimonials, but do NOT back them with claims of THEIR OWN. Why? Because they know it is illegal to make false claims themselves. By making use of false testimonials they try to escape responsibility. A glowing testimonial which is not backed by the manufacturer's OWN CLAIM may be a danger signal. Stay clear of such models!

Disregard testimonials. So many of them are exaggerated that MIDLAND no longer prints them, although we have scores of unsolicited letters of praise.

Look for the MANUFACTURER'S OWN CLAIM. If you can't find it, it is probable that the model is NOT a good flyer. NO MATTER HOW MANY TESTIMONIALS ARE PRINTED.

How many manufacturers print their own flight claims- MIDLAND — and who else?

MACCHI low-wing pursuit monoplane, first cousin of the seaplane racer said to have made 470 m. p. h. on secret tests at Lake Garda, Italy. Wing span 11 in., weight 3/8 oz. One of the prettiest models ever built, easily constructed, and capable of long, fast flights.



BOEING P-12-F biplane fighter. Wing span 11 in., weight 1/2 oz. A hot-looking model, designed to out-fly nearly all other model biplanes, regardless of price. As nearly crash-proof as a model can be made.

MIDLAND presents two brand-new models for your enjoyment. The only satisfactory small models sold. Better in many ways than expensive sets. Our new, exclusive monocoque construction gives a very simple set, a very easily built model. Build them in one-tenth the time an ordinary model takes. A razor blade the only tool you need. Light. Strong. More flights, fewer tedious repairs. Good-looking. Beautiful proportions, smooth surfaces. No wrinkles. No starved-looking ribs or formers to show through. Rise off ground. Fly 150 feet or more—further than many large models claiming longer flights. Both sets include die-stamped aluminum propeller from 11% to 56% more efficient than any other we have tested, ready-made noseblock and disc wheels, special rubber motor, ready-cut struts, etc., with clear building and flying directions. Packed in unbreakable container. EITHER SET ONLY 50c! (65c in Canada.) Order today. We pay postage. Check or money order safer than cash. Send no stamps. We do not fill C. O. D. orders. Please give full address so that we can fill your order promptly.

MIDLAND MODEL WORKS
Dept. V, Chillicothe, Ohio

Cash in on these Midland values! Details of three money-making plans with each set.

HEY YOU, FUTURE MASTER AIRMEN!

We want you to get acquainted with the favorite ships of the Master Airmen of to-day, because you will be flying them by and by. Each month we will feature some famous plane. This month it is the Gee Bee Racer, which was recently flown by Boardman to a prize winning, in which it is reported to have exceeded 300 M. P. H. Our extra full plans for a 22" flying model are only 15c, and complete construction kit, with plans, $1.50. Rush in your order and see how quick the world's fastest racer can get to you. The Fairchild "24" Cabin plane, shown in the cut, also makes an ideal flying model, as it has a long body, which gives a longer motor base, permitting more turns on the rubber and longer flights. Our full-sized 22" scale plans cost only 15c, and the complete kit, with plans, $1.50. Another winning 22" model is the High Wing Pursuit, plans 10c, complete kit with plans, $1. All the following plans cost 10c each: Ansaldo, the great Italian War Plane; Albatross: Bellanca, Jr.: Boeing, P-12B; Baby Hydro; Bernard: Fok. Amphib; Fok. D. VIII: Fok. Tri.: Gloster IV; Hawk F-6E: Hell Diver; High Wing, Jr.: Mystery "S"; Nieuport; S.E. 5; S.P.A.D.; Sopwith D.H.: Stinson: Vega: Ptalz: Laird: Ott Hydro, Etc. We also want to send you literature describing our model airplane gasoline engines, from 1 bird power to 1 H. P. Just drop us a postal.

BUILDERS OF BUSINESS INTERNATIONAL
Model Airplanes Dept., 25 E. Clinton St., Chicago.

motoring the models and this is another decided advantage in favor of the present day builder. Japanese paper has almost entirely superseded the silk surfacing of former years and wire wing constructions are seldom seen at the present time.

* * *

WONDER if we'll have the rotating cylinder engine back with us? There are at least two new rotaries now in the experimental stage that bring our memories back to the old Gnome and LeRhone types. They have their good points—and bad ones.

* * *

JUDGING from reports, the Paris Aeronautical Exhibition was a great success, although startlingly new types were absent. The Berlin Show which preceded the Paris Show rather indicated more original development in lightplane construction.

* * *

STAINLESS steel is rapidly becoming a basic airplane constructional material. There were many examples of ships built from this material at the Paris show. Besides its power of resisting rust and corrosion, the new steel is exceedingly strong and well adapted to airplane work.

Just as a reminder, stainless steel is the invention of Elwood Haynes, an old time American automobile builder who engineered the old Haynes-Apperson car back in 1900-1910 and who is reputed to be the builder of the first successful automobile. Mr. Haynes, primarily a metallurgist, developed many of the alloy steels employed in auto construction.

* * *

WE ARE waiting, with considerable impatience, for the conversion of the Ford V-8 engine into an aeronautic engine by our readers. So far, no one has submitted photographs of a V-8 motored ship for Our Reader's Department, and we'll be all on edge until someone comes through with the dope on this subject.

* * *

AND just one thing more,—you lightplane fans. Tell us what you think of the proposed lightplane association—very frankly—and whether we can expect your support when the organization is completed. Tell us what you believe should be incorporated into the rules and regulations outside of combating the license situation. So long.

J. B. R.

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Howl Department

(*Continued from page 86*)

home-built ships. I will venture to say that within a few years the airplane could be bought for the price of an automobile.

Hoping this will be of general interest, I close with best wishes for a howling success. Yours truly,

J. P. Brown.

* * *

LAWRENCE J. NOLAN, 4437 W. Fullerton Ave., Chicago, Ill., is in favor of treating the Illinois State lawmakers to the same dose that they conferred upon the solons of North Dakota. Mr. Nolan speaking.

I read with great interest the account of the modification of the rules and regulations for amateur flying in the state of North Dakota. At the time, it occurred to me that this same thing could be accomplished in Illinois, so now I am very pleased to learn that the staff of your magazine has decided to take up the fight. This is exactly the impetus that is needed to get us off to a flying start that will end at Springfield with the same modification of the laws as in North Dakota.

Of course, there will be many opposed to this measure, but they will be overcome by the avalanche of signatures which your magazine can gather. It has been proven that popular opinion can be changed and also the minds of the legislators by a sufficiently large petition.

A plane built by an amateur would be inspected and checked and certain regulations made concerning the places over which a plane built by an amateur could fly and from what fields the planes could take off from or land on, so as not to endanger planes engaged in regular service.

There should be a certain amount of government supervision, such as the time and spacing of the tests, etc. Naturally there will be a great increase in the number of planes, consequently an increase in the number of fliers and the more fliers the greater the future of aviation. Every signature that you obtain is a vote for aviation and herewith is mine.

Lawrence J. Nolan.

Well, we only hope that we can get some of the Illinois boys to go down to Springfield and give our law-makers an

(*Continued on next page*)

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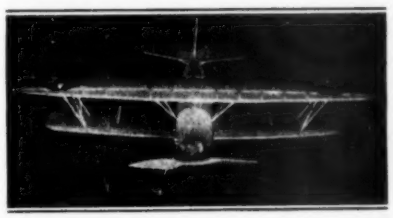

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earful of the truth. It's been a long time since high-pressure truth has been unloaded in Springfield, and it will be a decided novelty.

* * *

FRED J. MILLER, 10 Lee Avenue, Ridgewood, N. J., is in favor of Mr. Long's proposal for an Advisory Committee. Here he is.

That was a swell article on amateur flying by Leslie Long in the December issue. What we need now is a solid, fact presenting petition, to present to our state legislatures. The Popular Aviation Advisory Committee Mr. Long suggested wouldn't be half bad.

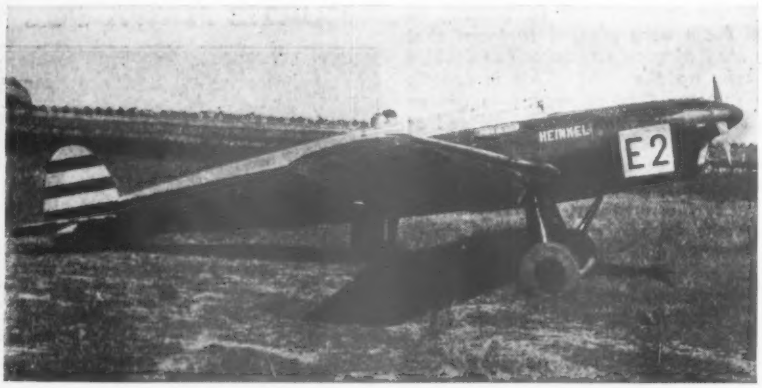
How about printing plans for the model L. N. Heath with the ailerons and empennage of wood construction? A bolted tubing fuselage would also be a feature desired by amateur builders. This would provide a way for the amateur builder until the time comes when he can apply for his amateur construction license.

Yours very truly,
Fred J. Miller.

Here is another angle to the game. A sort of a tentative or probational license for the beginner and a final constructional license for the advanced builder or experimenter.

What is Doing in Aviation?

—the answer will be found in P. A.



This is the Heinkel monoplane that has proved so popular in Germany—a clean-cut looking ship. More will be said about the Heinkel in the March issue.

A NOTE TO OUR READERS

DESPITE the depression, the circulation of POPULAR AVIATION is steadily increasing. And there are reasons, of course.

This large circulation and sale are due to reader interest. POPULAR AVIATION has always been the leader among aeronautical publications in printing the most interesting articles in a non-technical, easy-to-understand manner.

And second, P. A. has always warmly supported the interests of the amateur aviator and home-builder in all of their activities. It has been honest, fearless and aggressive in the promotion of amateur flying and experimenting.

Third, POPULAR AVIATION covers all branches of aeronautics—military, commercial, and private. It carries articles on dirigibles, autogiros, balloons and helicopters as well as upon the development of the airplane.

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Air Hostess

(*Concluded from page* 82)

preciation for a pleasant journey. The letters read like "thank you" notes after a week-end visit rather than correspondence from paying passengers.

The presence of an air hostess makes a trip by plane a social engagement. She is the common contact between passengers. Through conversing with her, the travelers drift to talking to each other, a practice which has made air travel the most enjoyable means of transportation.

HIGH flying ladies must be resourceful. Do you require assistance in completing your cross word puzzle before landing? You'll find that the hostess is an expert. She should be. She has assisted several thousand in her two years of service. Is a fourth needed for bridge? She is ready to play if no one else requires her attention. But few people play cards now on long runs. They find it more entertaining to talk to their fellow passengers, for the people who travel by air are interesting people—senators and congressmen, experienced travelers, bank presidents, and business leaders. The developments in making the cabins of planes quieter have aided the art of travel conversation.

The outstanding example of an air hostess's resourcefulness has been aired. It is so unusual and illustrative of the air hostess service that it deserves mention. Among the passengers booked from New York to Jacksonville, on the Eastern Air Transport system, was Seaborn Howard Wade. There was no special description. Great was the air hostess's consternation to have a sixteen month old youngster thrust into her arms a few minutes before the plane's departure.

Owing to the mother's illness, the baby was being sent to his grandmother. The father did not wish to leave his wife and there was no close relative. And he felt that the air hostess was as efficient and as reliable as any one he might select.

Was Miss Rita Brady, the air hostess, confused? Yes, but only for a moment. She had the pilot radio ahead to every landing field and her passenger was provided with fresh milk prepared especially for a youngster of his age. At the end of the trip he was handed, smiling and content, to his anxious grandparent.

"A strange experience?" Miss Brady repeated when questioned. "Not at all. We are expected to be able to cope with the unusual."

And becoming acquainted with the leading cities of America. Never being quite sure where you are going to be the next night. Few high flying ladies have definite runs. Where the ship goes, the hostess goes. If a plane should be switched from one run to another, the hostess generally goes with it. It is for this reason that she

carries an overnight bag with her wherever she travels.

THE air hostess finds it difficult to make social appointments. She may accept an invitation to dine with friends in Richmond only to discover at the last minute that she will be in Charleston that evening.

Airplane journeys are becoming popular on honeymoon trips, but a plane is one place where honeymooners are not wholly popular. The blushing bride employs a false timidity as an excuse for clinging to the arm of the lucky man. Passengers may interpret coyness as nervousness, and nervousness unless checked immediately becomes contagious.

One of the hostesses employs the technique of asking the happy couple if this isn't their first flight and usually they cease their ostentatious behavior to convince the hostess that travel by air is no novelty. But sometimes it doesn't work and the hostess is compelled to let everyone know that there are honeymooners on board.

Pilots indulge in a mild form of hazing to keep air hostesses in their place. There are frequent occasions when a plane is sent from one point to another without passengers. This is called "ferrying" a plane. Ferrying is hard on hostesses. Pilots can demand more service than a ship full of passengers. The plane barely leaves the ground when the call comes, "Coffee, please."

The service is prompt. Remember the pilot is captain of the ship. And a few minutes later:

"Coffee, please."

And after another short interval:

"Coffee, please."

This is just an introduction for what is to follow.

The pilot orders the hostess to the rear seat. And then the tail begins bobbing up and down. It's a tough hostess who comes through smiling.

Hostesses have preference as to weather. Some like calm days for flying, some like rainy days. Marian Cook, one of the long service hostesses, who has flown in all weathers, prefers clear cold snowy days. She claims you'll never know how beautiful snow can be until you see it from the air. But they all agree on one thing, rain or snow, wind or storm—there is nothing to equal flying.

END.

Rubber Driven Car

(*Continued from page 102*)

By actual dynamometer test, the energy stored by in these 16 rubber bands has been found to be 28,000 foot-pounds, capable of exerting nearly one horsepower for one minute.

The right rear wheel provides only the forward drive while the reverse is through the left wheel. Idler pulleys, operated by levers on the side of the body, can be brought to bear on either belt engaging the forward speeds or reverse.

When the driver presses the left foot pedal, a clutch grips the cross-shaft locking the rubber band motors while the car free-wheels, thus conserving the energy of the "motors." The car can be stopped with a conventional foot brake but it is better, when conditions permit, to check the movement of the car by engaging the reverse idler pulley. This operation restores a few turns to the rubber band motors.

The rubber bands are wound with a special dual winding device which can be attached in the chuck of a strong breast-drill—or better still—in an electric drill. The bands are pulled out through holes in the end of the frame during the winding operation. Stretching the rubber tautly during the winding makes it possible to contribute many more turns to the "motor."

If the driver uses the stored up energy conservatively, that is, free-wheels as much as possible, the baby car will travel over two miles of good pavement on one winding. And if fitted with extra powerful "motors" and a special gear ratio, it will travel at truly amazing speed for a few hundred yards.

END.

Novel Plane

(*Continued from page 93*)

function of the wing. The French Air Ministry, which gave Gerin wings wind-tunnel tests at speed up to 350 miles an hour, reported that "We conclude that as a result of these trials, the opening and closing of the mobile surface of the Gerin wing operates in a wholly satisfactory manner".

The ailerons are located at the wing tips in the machine under way, but most of the control surfaces are contained in the tail assembly. As these are sufficient to control the plane with the wings at their fullest expansion, the Gerin plane is extremely sensitive.

END.

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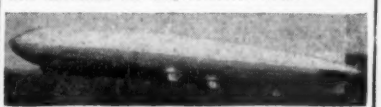

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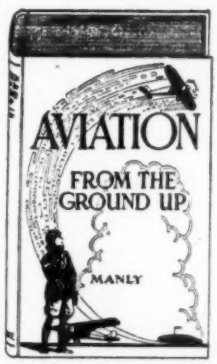

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Aero-Sportswomen

(*Continued from page 96*)

creased to over 600, which is an indication of what we may expect in the future."

With her usual modesty, Miss Earhart refrained from mentioning her own contributions to aviation history.

Naturally reserved, yet intense in purpose; capable and self-reliant, yet womanly and intelligent—and without any quality that makes for sensationalism—Miss Earhart is an ideal person to represent women in aviation to a skeptical and critical Public.

SINCE women have decided they have a place in the air the Federation Aeronatique Internationale deemed it necessary, in the summer of 1929, to establish a separate category for women's records.

Previous to this time, six technically unofficial records were made by American women. Viola Gentry, dean of women endurance fliers, established a record for women by staying aloft 8 hours and 6 minutes. This was an unofficial world's record.

Two weeks later, Bobbie Trout broke this record while cruising over Los Angeles and the San Fernando Valley. She stayed aloft 12 hours and 11 minutes, munching concentrated food and drinking hot chocolate.

Elinor Smith, singing to keep awake after the first 8 hours, broke Bobbie Trout's endurance record just 29 days later, by staying up 13 hours and 25 minutes.

Miss Trout, a month later, came back with a rebuttal flight and recaptured the record from Miss Smith by staying upstairs 3 hours and 48 minutes longer. With this flight, Bobbie Trout also earned the distinction of being the first woman ever to fly through an entire night. The women's endurance record was once again back in California.

California kept the record for several months with the help of Louise McPhetridge (Thaden) who completed a duration flight of 22 hours, 3 minutes and 28 seconds in March 1929. Although she had 12 gallons of gas left in her tank, she decided to land when she found it difficult to keep awake.

Elinor Smith again captured the endurance record that May by cruising 26 hours and 27 minutes over Roosevelt Field, N. Y. To stay awake, Miss Smith read *Tom Sawyer Abroad.*

END.

Forced Landing

(*Continued from page 90*)

"There were several other planes in the air and I managed, after some fashion, to follow them. When they started down, I tried to follow, and as luck would have it, pushed forward on the stick, instead of backward.

"But I didn't have sense enough to throttle down, so overshot the Navy field. But ahead of me was the Army field, and not being in a particular frame of mind, just then, I chose the Army.

"Holding the ship steady as I could, I touched earth,—they told me afterward,—in a perfect three point landing. But I didn't stop, then! Oh, no! I kept taxiing round and round, the other planes giving me a wide berth. Finally I turned the right gadget (ignition switch) and that shut off the motor Whew!"

Well—talk about thrills—we guess maybe Corporal Torner's crowns them all!

The Army ambulance, fire apparatus, etc., were out to meet the strangely acting skyriders, and explanations were in order.

Torner's superior officers claim he has a perfect right to a case of the "jitters," if he is so minded—for a man, who, on his second trip into the air, is able to land a plane safely, and save his own life as well as that of his pilot, deserves SOMETHING.

At the Base Hospital the physicians stated that Sergeant Hofer had a severe case of influenza, which caused him to lose consciousness.

END.

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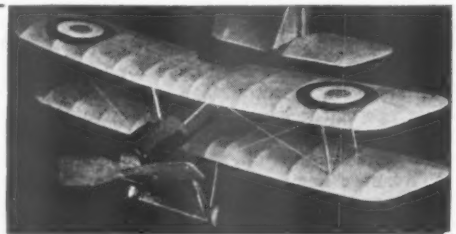

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A Chat With Lothar Richthofen

(*Continued from page* 78)

were to fly over the hangar of the British 209th Squadron. The artillery could get the range. When the officers signaled, the artillery was to put down an intense box-barrage completely isolating the R. A. F.'s flying field.

"Lowenhardt calculated that the British would take to their dugouts during the barrage. Then our planes could land inside the box-barrage and recover Manfred's body. The barrage was to continue until our observers saw our planes soaring aloft from behind the British lines."

"But there would be countless soldiers at the air post. The box-barrage would only isolate the airdrome, it wouldn't destroy all life within it," I remonstrated.

"You are correct. Perhaps that is why the Adjutant refused his permission. He flatly refused to give permission for such a reckless plan to be attempted."

"A foolish plot, but a beautiful demonstration of the love and loyalty the officers had for your brother."

"But the officers were not easily discouraged," Lothar continued. "The Britishers, at that time, were shooting our planes down at the rate of twenty, yes thirty, and even forty a day. Our Air Service was in desperate danger of losing its supremacy. With Manfred dead it was feared the Air Service's morale would collapse, which, as you know, later came about.

"Our officers believed their Ace leader had been murdered. They wanted to do something daring, startling to arouse the world, to focus attention on his death and on such a great demonstration of courage on the part of the German Air Force. The recovery of Manfred's body seemed to be the one and only thing to do to accomplish this.

Again the grief-stricken officers wanted Manfred's body on their side of the lines—among friends. The more radical and determined officers refused to take no for an answer. They worked out another plot. It was intriguing, gigantic in scope.

"THEIR plot was to mass twenty divisions and throw them into a determined assault against the British. Bertangles to be their objective. Five thousand cannons were to be used to completely isolate the sector. Hundreds of tanks were to cooperate with the advancing infantry. Two of the younger officers volunteered to go in one of the larger tanks.

"When our shock troops succeeded in crushing the British lines and had located the black tent hangar at Bertangles, the tanks were to dart forward, form a solid defensive ring of steel around the tent hanger where Manfred lay quiet in death.

"The officers intended to snatch his body, put it in the tank and bring it back to Cappy."

"Good heavens!" I exploded. "Such a thing put into effect would have meant the death of probably a hundred thousand men—and the largest percentage would have been your own soldiers!"

"The young officers were not to be discouraged by Headquarters turning down their plan," continued Lothar von Richthofen. "They carried it to the supreme Field Headquarters. Field Marshall von Hindenburg turned them down with a gruff, 'Utterly preposterous. Has the air-force gone mad?' "

I reflected: "It would have been a gigantic military operation . . . as spectacular as the way Manfred commanded his huge squadrons of Fokker triplanes. But all those thousands of lives would be wasted, not to gain a military strategic victory nor an important salient but merely to recover one dead body of a German pilot!"

Lothar answered: "He was a great national hero, a great fighter, the greatest in the world. Our officers felt they owed the attempt to his memory. Personally, I never could have been in favor of such a plan. Germany had suffered and lost enough. Twenty divisions or a thousand couldn't give Manfred back to his Fatherland."

I flew away from Schweidnitz, my head buzzing with thoughts, not of Manfred von Richthofen, but of his comrades-in-arms. Of their zeal, hero worship, loyalty, intense love of their Fatherland and their *Jagdstaffel* leader.

END.

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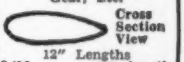

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How to Start an Aero Club

(*Continued from page 92*)

DO YOU think that any of these things would happen to the club you intend organizing? No? Well, then go ahead and get busy.

Probably the first thing for you to decide upon is how much money you can individually sink in a club and how many other people can put in a like amount. If you can gather around you at least 25 people who can invest a combined total of $4000, or over, I would advise writing to the National Aeronautic Association at Dupont Circle, Washington, D. C., for application blanks for membership of your chapter in their association.

There are many people who condemn the N. A. A. as a stodgy, reactionary outfit, but more people feel that it is doing something to help everybody who can, at least, do something to help themselves.

Even if you do not believe that you and your friends can qualify financially, it might be well to investigate the N. A. A.'s proposition, which provides insurance for the airplane beyond the first $300 damage incurred in any one crash.

Protection is also furnished both the club and its individual members against liability to the public up to $20,000 for injuries to one individual or a total of $40,000 in any one accident, as well as against passenger liability, provided that no paying passengers are carried. Protection is furnished, finally, against all claims for damage done to the property of others up to $10,000.

In rather high-falutin' language, the N. A. A. prospectus says "The importance of insurance cannot be overstressed. There are some flying clubs which are so fortunate as to have members wealthy enough to provide new airplanes without hestitation in case of crash, as well as to bear any risks of liability or property damage suits which may exist.

In most instances this is not the case and several clubs, which started under favorable auspices with an enthusiastic membership, have been driven into inactivity or dissolution because of their inability to procure satisfactory insurance protection. Again in the early days of their operations, they may have encountered some stroke of adversity from which they were financially unable to recover.

In the N. A. A. plan, each club selects its own officers and determines who its members will be; but the club obligates itself to conform to certain rules for safety and financial security. The membership may include both flying and sustaining members, the latter to take part in all the club's social activities and also to receive flights at a smaller cost than is charged to non-members when carried as passengers.

THEY recommend a 25 percent reserve plus $200 for operating expenses and state that a typical club or sportplane with a new engine, selling at an average of $3500, would require an initial investment of $4575. The dues recommended are $15 for flying members and $25 or more for sustaining members. A rate of $10 per flying hour is also believed a fair one by the N. A. A.—as follows:

Gas and oil	$2.25
Hangar rent, on basis of 300 hours flying per year	1.35
Engine overhauls and minor repairs	1.00
Mechanical service	1.00
Minor airplane repairs not covered by insurance	1.50
Miscellaneous	.20
Depression reserve — new plane after 1500 flying hours	2.70
Total	$10.00

"Ten dollars an hour seems high", writes a young friend, "so why bother about a club where $10 an hour is the flying charge, when I can get dual instruction at a small flying school nearby at $10 an hour and solo at $7?"

"No club for mine," stated a youngster to me two months ago, when I passed through Dallas, Texas, and was marooned by bad weather some miles east of town," Bill Long's school at Love Field will give me enough instruction, both ground school and flying, to qualify me for private pilot's

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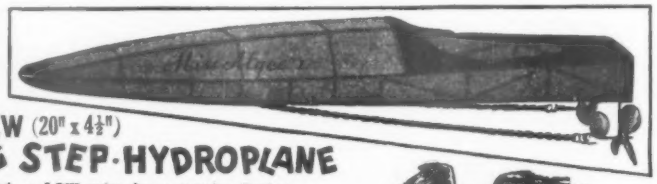

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license, for $250, using Fleets in the bargain."

Very true, but not all prospective pilots can spare the time to devote exclusively to a school flying course, nor can they afford even the $250 for instruction on Fleets nor $200 for instruction on smaller ships like Aeroncas or Heaths. The Flying Club then appears to be the solution, but many school operators are dead set ag'in 'em. Against all of them? Let's see.

"A club in this vicinity sunk about $1700 into their outfit and got themselves an OX powered ship that had been used before," explained a school operator in Ohio. "The ship was worth the $1500 they paid for it, but the club never was competent to handle itself. They got a total of 22 hours or so out of the ship, with one member soloing. Then the ship,—and the club —went on the rocks. I could have given them a lot of instruction for that money."

"Suppose the club had gone along O. K. and soloed most of its members—then how would you have felt?" I asked him.

"I'd have asked them to let my men overhaul their engine and plane when they needed it," was the answer, "then would done some favors for them and talked them into taking advanced instruction on cabin ships and heavier open-cockpit jobs. They could not have afforded to do this within the club, but I, with my fleet of larger ships, would be able to service them at low rates, especially if they could guarantee so many hours per week for me.

"A well run club should receive the support of local school operators, especially as some school operators, are also distributors for airplanes and may sell one to the club. When a club appears to be starting up in this part of the country, I approach them and make my proposition, $290 for ground school and flying instruction to qualify *one* student for private license, $275 apiece for 5 students from the club, $250 apiece for 10 and $225 apiece for 15 or more. However, they must guarantee me a certain number of hours during the week and also on Saturday afternoon and Sunday, whenever the weather is fit for flying."

This school has recently changed its rates. I am not sure what the present rates for mass instruction would be.

"Should they desire to own their own airplane, I give them the benefit of my advice. Twice I have been told that it wasn't wanted. The two clubs failed; souring most of its members on the flying game in general and indirectly hurting all of the legitimate schools. It takes more than a yen to fly—to run any school—club or otherwise. It takes a business head and a bit of experience in aviation."

EDITOR'S NOTE: *The second article of this series by T-2003 will appear in the March issue.*

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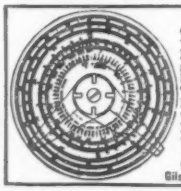

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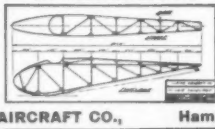

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(Continued on next page)

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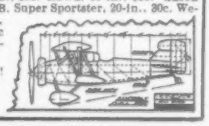

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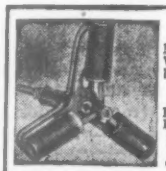

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Power Chart

(*Continued from page* 101)

speed at the right (66.5) straight across the chart to the scale at the left where a wing loading of 15 pounds per square foot will be indicated.

END.

Canadian Lab

(*Continued from page* 87)

right or left hand rotation of powers up to 1,000 horsepower at speeds up to 2500 r. p. m. In addition, facilities are provided for determining the detonation and other characteristics of aircraft engine fuels.

The engine dynamometer enables accurate tests to be made of aircraft engines under conditions similar to those in an airplane in flight, the air flow for cooling being provided by means of a powerful fan driven by 275 horse power motor and an appropriate thrust being applied to the crankshaft in lieu of the propeller thrust. Other equipment enables the characteristics of the fuel, oil and accessories such as spark plugs used during the test, to be accurately and scientifically determined.

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END.

Kitty Hawk

(*Continued from page* 100)

as homemakers to create better surroundings for themselves and their families. Not far from here at Roanoke Island was born Virginia Dare, the first child of British parents in America.

"This American victory for the human race over the forces of greed and oppression was not won without sacrifice of blood and treasure. The constant increase of governmental functions is a decided threat to freedom and individualism. As the beacon light from this shaft will guide mariners of the sea and air to harbors of safety, so may the bright rays of individualism and equality of opportunity that made possible the feats of Wilbur and Orville Wright, show us the way to the achievement of the ideals of America."

The Hon. J. C. B. Ehringhaus, Governor-elect of North Carolina, and Representative Lindsay Warren, of the First North Carolina District, also spoke, each paying tribute to the Wrights and their achievements. Miss Ruth Nichols, one of the world's outstanding women fliers, paid a brief tribute and then, standing in the rain before the face of the monument, unveiled the marker, which stands atop of Kill Devil Hill, a large sand dune.

Hardly had the exercises been completed when the sun came out, and the weather was clear as honor guests of the occasion gathered at Carolina Beach for a luncheon given by the Kill Devil Hill Memorial Association. Orville Wright renewed acquaintanceships with residents of the Carolina Banks.

END.

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